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PUBLIC HEALTH REPORTS

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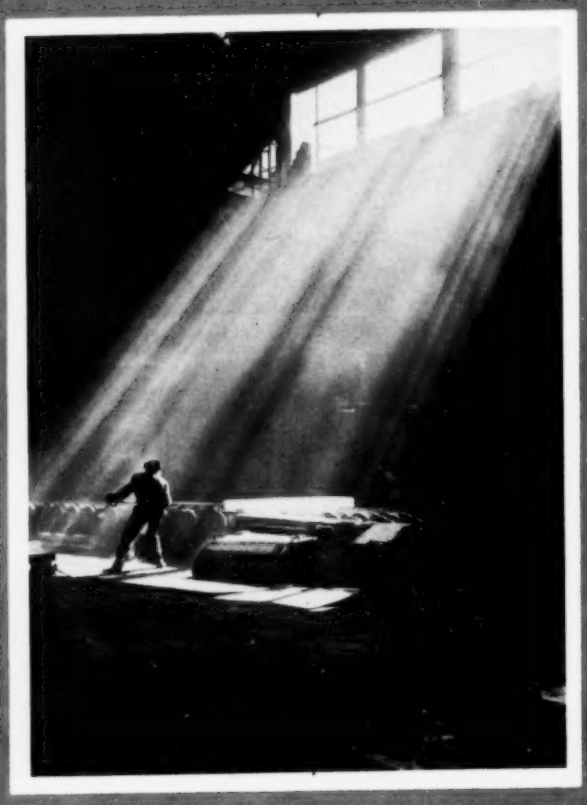

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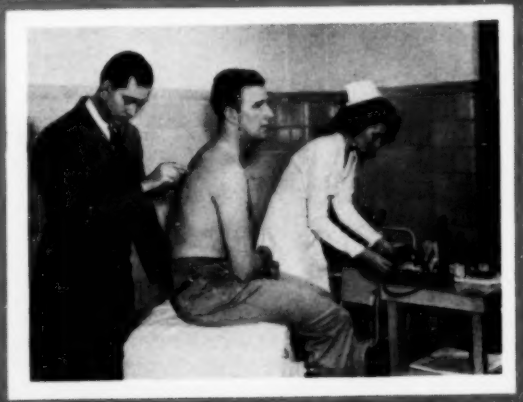

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Elements of Occupational Health Programs

An international group of experts jointly convened by the International Labor Organization and the World Health Organization in Geneva in 1950 agreed that "Occupational health should aim at: the promotion and maintenance of the highest degree of physical, mental, and social well-being of workers in all occupations; the prevention among workers of departures from health caused by their working conditions; the protection of workers in their employment from risks resulting from factors adverse to health; the placing and maintenance of the worker in an occupational environment adapted to his physiological and psychological equipment, and, to summarize: the adaptation of work to man and of each man to his job."

A second report of the group deals broadly with measures of general health protection of workers in places of employment, notification of occupational diseases, organization of health service programs in large and small plants and agricultural enterprises, and methods of cooperation between public health and industrial health services.

Recognizing that effective action requires "close cooperation with community health agencies working on parallel problems," *nutrition* of workers is seen as a concern of occupational health. Education not only of workers but of the housewife who prepares his meals is underscored. In the matter of *communicable disease control* the general objective everywhere is to detect cases and render them noninfectious. "This objective is especially important in industry, not only because there are hazards of infection of large numbers of persons in the working environment, but also because the place of employment provides valuable opportunities for the finding, treatment, and rehabilitation of cases."

Among *maternal and child health* considerations, "the protection of the health of pregnant women who are employed is of the first importance." The objective of *mental health* activities is "to promote the health and happiness of people at work" and the way to do it is "not the provision of psychiatric services, but the planning of work tasks and patterns of industrial organization which do not run counter to human emotional needs."

Environmental sanitation is important for the prevention of spread of disease by water, food, air, or other means, and for avoiding the creation by industry of sanitary hazards for the surrounding community. *Health education* is a basic need, since "the effectiveness of all health service activities is directly related to the understanding and knowledge of the workers." *Nursing services* in the community "should be closely related to the medical service of the plant."

The general objective is to coordinate the official and unofficial services "so as to accomplish the largest volume of public health effort at a minimum expense to the community," such programs providing for "the complete cooperation on the local level of all the agencies having a bearing on the health of the worker."

—Joint ILO/WHO Committee on Occupational Health, Second Report. World Health Organization Technical Report Series, No. 66, July 1953.

frontispiece . . .

The insets symbolize the fact that research and service are two sides of the same coin of occupational health. New processes in industry produce new health problems requiring imaginative investigations. New developments in the medical and related sciences offer means of attacking old as well as new problems more effectively. In the September issue of Public Health Reports trends in air pollution control were examined. This month, the matter of occupational disease reporting is explored (page 940). Succeeding issues will report on other elements of occupational health, especially those relating to community and public health relationships.

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Published concurrently with this issue:

PUBLIC HEALTH MONOGRAPH NO. 14 . . . Accident frequency, place of occurrence, and relation to chronic disease.

Selwyn D. Collins, F. Ruth Phillips, and Dorothy S. Oliver.

68 pages and illustrations. A summary and information on availability appear on pages 993–995.

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Tuberculosis: A Time for Decision

By THOMAS PARRAN, M.D., Dr.P.H.

AS THE HENRY PHIPPS INSTITUTE celebrates its first half century of achievement, it is useful to undertake an appraisal of where we stand today in the battle against tuberculosis, and to attempt to draft the strategy for finishing the job. I realize the futility of hoping to contribute original ideas at this time for decision. All I presume to offer is a candid camera shot of the forest in which the tuberculosis experts have been doing excellent work among the trees.

That you may forbear as I attempt this, I quote Laennec, who wrote to his cousin: "Do not fear to repeat what has already been said. Men need these things dinned into their ears many times and from all sides. The first version makes them pick up their ears, the second registers, and the third enters" (*1*).

Dr. Parran, dean of the Graduate School of Public Health of the University of Pittsburgh, was Surgeon General of the Public Health Service from 1936 to 1948. In an article entitled, "No Defense For Any of Us," which appeared in the April 1938 issue of Survey Graphic, he suggested methods which could be followed in setting up a program for national control of tuberculosis, since many of the techniques used in the program for the control of venereal diseases, which already had been started, could be applied to tuberculosis control. During the early part of World War II, he supported the Public Health Service's experimental work on the use of small films in X-ray examinations. This work led to trials of the films on a demonstration basis. Soon afterward, in 1944, the national tuberculosis control program was authorized and began operation.

Early Approaches

Prior to 1900, public health measures were largely punitive. Quarantine, it was assumed, would erect safe barriers to the spread of epidemic disease. Later, specific immunization, long effective in the control of smallpox, was believed to be the method of fulfilling Pasteur's prophecy that "infectious disease would be banished from the earth."

Concurrently, the sanitary engineer played a major role in improving the human environment by the purification of public water supplies, the pasteurization of milk and other dairy products, and the draining or neutralizing of mosquito breeding grounds. He also initiated more sanitary methods in the handling of food, while the chemists taught processors how to preserve it safely. Refrigeration made possible a diet including fruits and green vegetables at all seasons. Nutritionists began nailing down some scientific facts as to what constitutes a good diet—they have no more finished their task than have the chemotherapists—and dietitians by the thousands emerged in a new profession to demonstrate these facts in many situations ranging from the factory lunchroom to the high school class of future housewives.

The Phipps Institute was born at one of the most exciting periods in the whole history of public health and preventive medicine. American living standards were being sharply raised and health standards along with them. There is no doubt that each set of conditions interacted upon the others and that hundreds of thousands of persons susceptible to tuberculosis yet not acquiring the disease were the beneficiaries.

Those who have devoted their lives to the control of tuberculosis have had valid cause for pride as they have watched the great downward curve of mortality from this disease. When the Phipps Institute was established 50 years ago, the "Captain of the Men of Death" was killing Americans in the most productive period of their lives at a rate more than 10 times greater than today. Today the world is convinced that tuberculosis is conquerable—convinced by demonstration rather than exhortation. Great minds, great hearts, great leadership, and great moneys have been rallied to this cause. Now, in 1953, the target has become measurable. The goal of eradication in this country and in our time is now attainable—at least to the optimist. And nobody but an optimist has any business in public health at all, in any of its branches.

Contributions by Nonmedical Men

The golden anniversary of the Phipps Institute represents, to my mind, an important factor in the progress of public health, but one often forgotten when the laurel wreaths are distributed and the accolades bestowed. It illustrates the great part played by laymen of vision, generosity, and courage who have contributed as greatly to the control of tuberculosis as has the brilliant work of scientists.

Many of the names are forgotten. One needs to dig below the surface in the history of this Institute, for example, to learn that when Henry Phipps in 1901 sought advice as to useful channels for his charitable endeavors, his close friend Samuel P. Harbison, of Pittsburgh, referred him to Francis J. Torrance, then a member and later president of the Pennsylvania State Commission of Public Charities. And in due course the Phipps Institute was born into the world of scientific aspiration. No matter how substantial its support in later years and in years to come from other grants and benefactions, we must never forget that its origin was due to the advice and encouragement of practical businessmen who had the vision to look beyond the obvious and the immediate.

Administrative leadership is also indispensable. I know of no single person who contributed more to tuberculosis control, for example, than Homer Folks, for many years secretary of the State Charities Aid Association of New York. His great gift of leadership, his capacity for organization, and his eloquent persuasiveness, along with his incorruptibility and fine intelligence, would have made him a success in any business or profession. He chose to devote his talents to the public welfare in general and to tuberculosis control in particular, for the benefit of the people of the State of New York. With Dr. Hermann Biggs, New York's first great health commissioner, to steer a steady scientific course and with Homer Folks

50 Years of Tuberculosis "Study, Treatment, and Prevention"

The past half century has been a dynamic period in the attack on tuberculosis—a time of high hopes sometimes realized, sometimes dashed, but withal a time of steady progress in the development of the basic and applied knowledge essential to the eventual conquest of the disease.

Spanning this period and contributing importantly to the record of achievement is the Henry Phipps Institute for the Study, Treatment, and Prevention of Tuberculosis. It was founded in 1903 by the Pittsburgh industrialist Henry Phipps, whose interest in tuberculosis was stimulated by Dr. Lawrence F. Flick of Philadelphia, one of the founders of the National Tuberculosis Association. In 1909 the Institute became a part of the University of Pennsylvania.

In February of 1953 the Institute celebrated its golden jubilee, asking leaders in the "study, treatment, and prevention of tuberculosis" to share their appraisal of our present status and future prospects.

The authors and Dr. Esmond R. Long, director of the Henry Phipps Institute and director of medical research of the National Tuberculosis Association, have made these papers available to Public Health Reports in advance of their appearance in a commemorative volume. The major portion of Dr. Parran's discussion of the prevention of tuberculosis appears here, followed by a condensation of Dr. J. Burns Amberson's remarks on treatment.

—The Editors

to educate the people and their legislative representatives, the Empire State got off to a head start in public health and in tuberculosis control.

As other examples of nonmedical statesmen in public health, let me cite Frederick T. Gates and Wickliffe Rose, who guided the Rockefeller philanthropies which promoted medical education, added so much to our knowledge of preventable disease, and demonstrated so early the practicability of applying that knowledge to human need throughout the world. These are but a few among the many lay workers who have made possible the near victory in tuberculosis control and the almost complete victory against other and more vulnerable ancient plagues. Whatever our plans for the next half century, if they are to be successful, they must depend even more than in the past on citizens such as these.

Motivated in part by what Newsholm calls "the sentiment against suffering" and in part by the instinctive wisdom inherent in groups of good citizens who care profoundly and who will work devotedly for a cause outside and beyond their personal advancement, these men set forth zealously with the twin weapons of faith and hope. They had faith in our form of government, which will back with tax support measures for the welfare of the people after their authenticity has been demonstrated by voluntary pioneering. They had faith in the capacity of the average citizen to learn—to change his personal habits, if need be, in his own interest and that of his fellow citizen. They had hope that bed rest, fresh air, sunshine, and good food would help the victims of tuberculosis; that less crowding in filthy slums would lessen the spread of infection; that bovine tuberculosis could be eliminated.

Sociologists tell us how well-nigh impossible it is that people might change their habits without any specific promise that whatever they might do or might not do would save them from tuberculosis. Nevertheless, the people were motivated to action; a vast number were persuaded to do certain things and to refrain from doing others. All this, to my mind, entirely justifies the statement in the recent report of the President's Commission on the Health Needs of the Nation, "The individual effort of an informed person will do more for his health and that of his family than all the things which can be done for them." You will note particularly the adjective "informed."

Current Status

Because the gains in the fight against tuberculosis have been substantial, we can accept rather cheerfully the fact that Pasteur was altogether too optimistic in his opinion that infectious disease could be banished from the earth and that Allen Krause in forecasting that the trend of tuberculosis rate would bring it to zero in 1935 was quite wrong (*2*). Tuberculosis we still have with us, but it is in manageable dimensions, at least as far as the Western World is concerned. Many persons now forecast that tuberculosis may become a minor cause of death in Western Europe, in North America, and in Australia before we know the reasons for this event. That would be good for humanity but a black eye for science.

By any scale of values, however, the 90-percent reduction in mortality rates in this country from 194 per 100,000 population in 1900 to less than 20 in 1951 is an outstanding performance. But there must be no complacency in our view of the tuberculosis that remains among us. It is not the time for a change in the energy and relentlessness with which the disease has been attacked. National averages are misleading. Tuberculosis mortality now is 3½ times as high in the nonwhite population as among white citizens. Iowa and Minnesota may have rates of less than 10 per 100,000, but Alaska and Puerto Rico have rates 6 to 10 times the national average.

Even though statisticians believe that 1952 figures will show it to be ninth among the causes of mortality, and although it now accounts for only 2 percent of deaths in the country as a whole, tuberculosis is still a leading cause of death among young adults. In monetary terms, national efforts to control this disease are costing the American people more than $350 million a year—a figure which does not take into account the cost and depreciation of hospital buildings or the training of professional personnel (*3*). If we try to estimate the loss in family incomes when the wage earner is separated from

his family for sanatorium care over long periods, and the fact that even though his life may be saved and his disease arrested he dares not go back to hard physical labor, the cost totals become astronomical. If one attempts to estimate the cost to the community of the broken homes so often resulting from tuberculosis either of father or mother, we would unhappily agree that tuberculosis still stands close to the top as a social tragedy, possibly exceeded only by mental disease.

Factors Affecting the Decline

Let us now consider briefly some of the reasons for the winning tide of battle thus far. We are faced at once with the paradoxical situation that not even the greatest living experts will make more than a cautious and qualified guess as to which of many relevant factors have had the greatest impact or what relative therapeutic or preventive weight may be given to any of them. A single exception to this generality is the epidemiological platitude that wherever the chain of infection is broken—whenever an early case of tuberculosis is taken out of the family, social, or business environment—x number of new cases do not develop. This single, simple fact may well be the keystone of the arch for the building of future programs.

Most experts are agreed that medical science alone cannot take major credit for the decline in tuberculosis rates, since the decline began long before control programs were initiated and before there were any scientific bases for such programs. For example, it has been estimated that the mortality rate in 1830 for the combined populations of Boston, New York, and Philadelphia was approximately 400 per 100,000 population; by 1900, this rate had dropped to approximately 250 in these three cities and to 204 in the United States as a whole.

As far back as 1937, when the mortality rate was far higher than today, Wade Hampton Frost, formerly of the Public Health Service and then of the Johns Hopkins University School of Hygiene and Public Health, expressed his belief that in this country we already had reached the stage at which the biological balance is against the survival of the tubercle bacillus. He felt that even though measures taken up to that date to limit the spread of the bacillus in our environment were insufficient to prevent the infection of the great majority, such measures might still have great effect.

Another consideration, Frost thought, is the fact of "conditions limiting the propagation of the tubercle bacillus, which are: (*a*) that in order to escape from its host it must cause a lesion which breaks through the surface—in general, an extensive lesion which severely damages the host—and (*b*) that it succeeds in producing such a lesion in only a limited number of infected persons."

Various other pathogens of man are subject to one or another of these conditions, but none to both. The combination of these two limiting conditions constitutes the peculiarity of the tubercle bacillus which makes it more amenable to control by case isolation than are such diseases as diphtheria, scarlet fever, or measles. Consequently, Frost concluded: "Although tubercle bacilli multiply within the body, in a great many cases they do not escape to reach other hosts. Logically, therefore, for the eventual eradication of tuberculosis it is not necessary to set ourselves the impossible goal of immediate and complete prevention of all transmission. It is necessary that the rate of transmission be held permanently below the level at which a given number of infection-spreading cases succeed in maintaining themselves" (*4*).

This epidemiological prognosis should spur us to find more hidden cases and isolate them more swiftly from their susceptible associates. It encourages us also, in 1953, to believe that the biological balance is increasingly on our side.

Elements of Uncertainty

Nor should we disregard the elements of uncertainty which Frost pointed out, "among them, uncertainty as to the stability of our civilization." In the atomic age that has been thrust upon us since his death, we are all grimly aware that tuberculosis control, along with every other good thing our western civilization has evolved for and through its citizens, may be discarded in the event of another global war.

But assuming that our civilization stands, and assuming a continuation and improvement of environmental control, Frost saw only two forces which singly or together might check or reverse the downward trend. They were (*a*) a decrease in human resistance to the disease and (*b*) some fundamental change in the virulence of the tubercle bacillus, the specific properties of which, as he pointed out, have changed little in modern times.

As to the first of these possibilities, it might be noted that an increase in racial resistance over the centuries may be of some importance in "tuberculized" civilizations, but it does not explain the recent precipitous fall. Conversely, the low racial resistance among populations rarely exposed to infection is acknowledged. But since we assume that in the future these populations will not have similar gross repeated exposures; this fact is not of importance.

Developments Since 1937

It has been said that the level of tuberculosis mortality is a sensitive index of a complex variety of environmental factors. Since Frost made his carefully calculated predictions in 1937, a number of things have occurred in this country to affect that index. It is not possible to list these things in order of importance for, in fact, we do not as yet know with any degree of accuracy what has contributed most to the decline in the tuberculosis rate. Nevertheless, it is reasonable to assume, on the basis of experience, that each in some degree has weighted the scales more heavily against the tubercle bacillus.

1. Living standards, including standards of nutrition, have steadily improved; levels of education have risen; hours of work have lessened; general public health measures have been broadened and intensified.

2. As a result of increasingly intensive case finding, the number of newly discovered cases reached a peak of 137,006 in 1948; since then there has been a slight decline, year by year, to 118,491 new cases in 1951. Mass radiography of whole populations has become economically feasible and is being utilized for the benefit of about 14 million American citizens each year.

3. Chemotherapeutic agents have proved helpful and may point the way toward a specific. Surgical procedures have been improved and are more widely used in appropriate cases to lessen the spread of infection and to prolong life.

4. The National Tuberculosis Act of 1944 charted a Federal policy and program for control of the disease, with States and research agencies cooperating, and authorized support for more extensive and more unified efforts.

5. A worldwide attack upon tuberculosis has been organized; the value of the BCG vaccination has been confirmed—though it is far from a complete answer for the prevention of tuberculosis—and it is being used on a broad scale internationally, especially in the war-torn and underdeveloped countries.

Quo Vadis?

At this point it is relevant to inquire, *quo vadis?* I agree with Dubos that progress does not necessarily consist of doing more and more of what has proved profitable in the past. Research is certainly needed. Even though the results may prove only that we are on the right track, research is needed to validate our going forward faster in the familiar channels.

But we cannot mark time waiting for the result of inquiries. In my opinion, these are some of the things we must go on doing at a brisk tempo, concurrently with a diversity of research:

1. Hospital beds more wisely utilized for the patients with active disease are the crux of the problem. Some waiting lists for such beds now are so long that the discovery of new cases in the absence of the means of relieving them perhaps adds to the sense of frustration.

2. More and better trained personnel are of equal importance with the provision of hospital beds. In some sanatoriums whole wings are closed for lack of professional staff. We need to recruit actively nurses, doctors, and technical personnel of all descriptions. We need to recruit an increasingly better type of student, and to make sure these are offered as good a professional opportunity in the care of the tuberculous patient as in any other area of medicine and public health.

3. Even though the disease may be eradicated

without better vaccines and drugs—merely by integrating biological wisdom with social technology in the management of everyday life—the search for the vaccine or for the drug might, in the long run, be simpler. A better vaccine or the new cure may be found. BCG and some new chemicals may be short steps in the right direction, or an entirely new direction may be indicated. Whatever the answer, the search must go on.

Exploration Needed

So far, I have been urging that we do more and that we do better some of the things already being done. Nevertheless, there are several areas in which we know very little about the potentialities for tuberculosis control and where exploration appears to be clearly called for.

For example, every student of tuberculosis is aware of the varying emphasis on diets over the years. Yet what, precisely, do we know about what types of food deficiency are or may be critical in their impact upon the patient? I am convinced only that during both world wars the lack of food was correlated with increased mortality from tuberculosis and that relief from a starvation diet was followed by a prompt reduction in mortality.

We have made general assumptions as to the relationship between "poor living conditions" and tuberculosis. Actually, we know nothing about it on the basis of scientific study.

We believe that exhausting physical work adversely affects resistance, but how we do not know. Does this factor or the working environment, or do both factors, account for the relatively higher death rate among older males? Springett maintains that despite the present form of the tuberculosis mortality curve, there has never yet been a group of men who experienced a greater mortality at ages over 45 years than their contemporaries experienced at young adult ages (*5*). Frost and others earlier reached the same conclusion, as the age "cohorts" of mortality were analyzed. From this evidence, can we conclude that tuberculosis deaths in later life are usually, though not always, the result of disease acquired many years earlier? In fact, it appears that the lifetime experience of any generation can be predicted from its level of mortality in the first years of life. Available evidence regarding exogenous and endogenous infections conflicts.

Even though it is not possible to change the totality of what we consider an adverse environment—in other words, we are not yet able to abolish poverty—may it not be found by careful investigation that some one factor predominates? Having found it, might it not be possible to ameliorate that one factor?

Research of this type is difficult and costly. It involves the skills of the social scientists integrated with the skills of public health and clinical scientists. The Graduate School of Public Health of the University of Pittsburgh is particularly interested in this type of study and is undertaking it in reference to certain other chronic diseases.

The Phipps Institute has pioneered in the fields of immunity and susceptibility in tuberculosis, and its experts would be the first to insist that the surface has hardly been scratched. Such work should continue, even if by some happy accident the perfect vaccine were to be discovered tomorrow, because of its contribution to our understanding of other disease processes.

We know little about the ways in which emotional stress affects resistance. That it does seems possible from the drop of the mortality curve in Japan, Germany, and Austria after the war had ended but before there were available good food, decent housing, or other factors, which in the United States we have considered basic for tuberculosis control.

Is the well-known tendency of tuberculosis to reactivate related to tension or emotional stress? Is this a factor among the infectious patients who leave the sanatorium against advice? Since 25 percent of our tuberculous veterans and an even larger percentage of civilian patients fall into this latter category, it would seem that we need scientists specializing in human behavior to integrate their skills with those of the tuberculosis epidemiologists and clinicians.

Expansion of Present Activities

Sanatorium care is the largest single debit entry in the United States control program. In

a recent review, Dr. Long very wisely suggests making more beds available for more patients by greater cooperation with the practicing physician, especially for those patients who have responded so well to hospital care and indoctrination that they may be sent home under proper medical supervision and chemotherapy (*3*).

This is sound in principle for several reasons: It should reduce the total cost of care, return the patient earlier to his family, and increase the interest and participation of more physicians in tuberculosis control. This last point is important, since private physicians now report only 15 percent of the new cases. Moreover, this suggestion is strengthened by the precedent of syphilis. A decade ago its treatment was practically a health department monopoly; today the private physician has taken over a very large proportion of it.

In addition to the mass X-rays, which serve as a dragnet gathering in many unsuspected cases, hospitals and clinics should be required to make a chest X-ray routinely upon every person entering for any disease condition. In view of the fact that the care of each tuberculosis patient costs, on the average, about $15,000, every institution of diagnosis or healing should utilize every opportunity to identify another link in the chain of infection.

From my own experience in dealing with syphilis and other communicable diseases, I would suggest a much greater use of the epidemiological method. This is particularly practical in this country during the present period of transition, when a large part of the population is not exposed to tuberculosis until adult life and many not even then.

In 1900, by contrast, our environment was literally saturated with the tubercle bacillus, like fog in a valley. Not so today, when there is evidence to show that tuberculosis is kept alive by a series of local epidemics. Intensive epidemiological study can ferret out the source, the contacts, and the secondary cases not only in households but also in schools, factories, restaurants, business offices, and through the routine X-ray of all patients of hospitals and clinics. Here are opportunities to break the chain of infection and save the maximum of human suffering and economic loss with the minimum of effort and expense. They should be explored more fully.

Steps Toward Success

It is highly commendable to have developed a more or less standard control program for tuberculosis, or any other disease entity. It will, however, become static and steadily less effective unless we constantly evaluate each part of it. We need to search endlessly for more facts, for new approaches. Even though our battle against tuberculosis has gone well, we are still at the frontiers of knowledge. I suggest, in short, more pinpointing of the predisposing and precipitating factors of the disease and their mechanisms of action, changing our emphasis as new truths become known, adding or subtracting one or another element in the program as knowledge grows and the disease declines.

"To combat consumption successfully," wrote Knopf of Philadelphia in 1901, "requires the combined action of a wise government, well-trained physicians, and an intelligent people." I doubt that his prescription for success can be bettered today. In this time we have set for decision, we have nothing to fear except complacency and dogmatism, nothing to avoid except inflexibility or inaction, and everything to hope for in a greater half century than the one just past.

REFERENCES

(*1*) Dubos, R., and Dubos, J: The great white plague. Boston, Little, Brown & Co., 1952.

(*2*) Rich, A. R.: The pathogenesis of tuberculosis. Ed. 2. Springfield, Ill., Charles C. Thomas, 1951.

(*3*) Long, E. R.: The problems of tuberculosis control. Editorial. Ann. Int. Med. 37: 1095–1099 (1952).

(*4*) Frost, W. H.: Risk of persons in familial contact with pulmonary tuberulosis. Am. J. Pub. Health 23: 426–432 (1933).

(*5*) Springett, V. H.: An interpretation of statistical trends in tuberculosis. Lancet 1: 575–580 (1952).

Treatment of Tuberculosis

By J. BURNS AMBERSON, M.D.

THE INTRODUCTION of streptomycin into the clinical treatment of tuberculosis in 1944 and the subsequent use of other drugs have led to radical changes in the management of this disease. Indeed, there has been no other comparable period in its history. The momentum originally imparted by the discovery of antituberculosis drugs is still felt, and it would be rash to predict when or where it may spend itself, so swift is the rush of events. It seems prudent, therefore, to characterize the following remarks as more of a commentary than a critique.

In the relatively short time since tuberculous patients first received streptomycin, it has been found possible, by adjusting the dosage and combining its administration with that of para-aminosalicylic acid, to circumvent most of its serious toxic properties, as well as to prolong the antimycobacterial effect through many more months than either drug would accomplish alone. There are now a number of other active antituberculosis drugs, the most potent of which are isoniazid and viomycin. Consequently, the variety of drug combinations which may be used simultaneously and in sequence becomes large and the task of assessing their efficacy quite formidable.

An accurate evaluation can be arrived at only after patient and sustained efforts in the laboratory and clinic, which will require years. Eagerness for progress should not be permitted to disrupt the methodical, time-consuming pursuit of scientific facts upon which clinical practice ultimately must stand. In dealing with a problem as complex as tuberculosis, a get-wise-quick approach is thoroughly unsound.

Dr. Amberson is professor of medicine at Columbia University College of Physicians and Surgeons, attending physician at Presbyterian Hospital, and visiting physician in charge of the chest service at Bellevue Hospital. He received the 1952 Trudeau Medal Award partly for work begun in 1926 and reported in the October 1931 issue of the American Review of Tuberculosis. Discussing the failure of a clinical trial of sanocrysin, a gold salt, Dr. Amberson described the criteria he used to judge the clinical effect of this chemotherapeutic agent against pulmonary tuberculosis. His outline of minimum "clinical, laboratory, and X-ray observations sufficient to warrant any reasonable conclusion from such a study" is as valid now as it was in 1931.

Early Favorable Effects

Largely because of the use of specific drugs, the early response of the tuberculous patient to treatment can now be said to be more uniformly favorable, more certainly predictable and, on the average, more rapid than ever before. Whatever the regimen adopted, the first maneuver in treatment is to attempt, as rapidly as possible, to suppress the activity of the tubercle bacillus and thus halt active, progressive disease. The effect of successful treatment is manifested by an abatement of toxemia—allowing the patient to recover his strength and feeling of well-being—and by a gradual restoration of normal physiological processes. Another easily observed effect is the retardation or arrest of active inflammation and destruction of tissue.

The early favorable effects of treatment are often conspicuous. The cough and expectoration may disappear, and drainage from discharging sinuses may dry up completely. The

subsidence of inflammation may also be followed by a resolution and absorption of inflammatory products which is remarkable or even dramatic. All this may be observed in the space of 3 or 4 months. But then further regressive changes of the lesions often tend to occur more slowly, and a time may come, perhaps after many more months, when little or no further change is observed, even though the symptomatic recovery is maintained.

Although the early halting of active inflammation and of exudation in and discharge from tuberculous lesions may not be synonymous with the death of the bacteria responsible, these favorable changes nevertheless benefit the patient. At the peak of these effects, necrotic lesions sometimes can be removed surgically without great operative risk. Therefore, one may think of the drying out of lesions as one of the most beneficent, rapid, and striking effects of specific drugs.

Drug Therapy vs. Rest Treatment

The mechanisms of healing under the influence of specific drugs do not appear to be essentially different from those occurring under natural conditions, often favored by a regimen of rest. With minor exceptions, the difference in the early response to treatment does not seem to be qualitative but, rather, a matter of speed and predictability. Thus, the question is raised as to whether these new developments justify or necessitate a change in our ideas regarding the use of rest treatment, which long experience has proved so helpful against tuberculosis.

An answer is difficult because of our limited knowledge of the way in which rest treatment exerts its favorable effects. These effects are vaguely identified as biochemical, hormonal, and general, but not primarily mechanical. Innate factors seem to be vital, and there is reasonable assurance that in most patients these can be raised to better levels by rest treatment and other general measures. If this be so, can specific drug therapy in any way substitute for rest? Certainly, during the early phases of active, progressive tuberculosis, when resistange is low, it seems rational and obligatory to give the patient the benefit of every available help. It is rather generally agreed, therefore, that rest treatment and general adjuvants are just as important as the administration of drugs, and in many cases probably more so.

Measuring Resistance

Since there is no accurate objective measure of resistance, it is necessary to estimate it almost entirely by clinical judgment based on experience. Although the early response to drug therapy is in most cases consistently favorable, the tendency to relapse after the discontinuance of therapy varies widely in different patients, and this tendency almost certainly is related in part to the level to which resistance has risen. It is much easier, therefore, to identify the time and circumstances initially calling for drugs than it is to identify the time to stop them. In some patients, an early relapse indicates that chemotherapy has been stopped prematurely; in others, it is continued for an unnecessarily long time, ostensibly for safety's sake.

This dilemma illustrates the practical problem of the physician and his patient, who perforce cannot wait for the laboratory to produce a reliable test of resistance. The best test we have now is the tolerance of the patient for gradually increasing activity, especially physical exercise. And since resistance is the only permanent defense against the infection, it is logical to stop chemotherapy (at a time when healing of the disease is judged to be well advanced) before allowing the patient unrestricted activity, and then gradually to test his tolerance of greater liberty under carefully observed conditions. Justification may be found for speeding his return to a productive life or to more prolonged and radical treatment. This is another one of the problems which require long and careful study.

Condition of Tubercle Bacilli

A word should be said about the condition of the tubercle bacilli which remain in tuberculous lesions, particularly those of a solid necrotic character, after the patient has recovered and his disease is called arrested or inactive. It

has long been recognized, on the one hand, that the bacteria may survive there for many decades while the patient remains well. Should a relapse occur, these survivors or their descendants are usually found to be the culprits. On the other hand, the bacteria may eventually disappear from the lesions or, if persisting, they may be found incapable of growth on artificial culture media or of causing disease in susceptible animals. A very lively question at the moment is whether the remaining bacilli are really dead, leaving behind only their skeletal remains, or whether they have merely been so enfeebled and modified by the antagonistic forces of nature that they are unable to keep their tenuous hold on life except in the lesions in which they are found.

How long is required under natural conditions for such changes to occur is largely conjectural, but usually it seems to be a matter of many years. It now appears that the continuous administration during many months of combinations of specific drugs such as streptomycin and para-aminosalicylic acid sometimes exerts similar effects on the bacteria. This observation tempts the most critical scientist to entertain the thought that the bacteria may have been killed by the drugs. It is legitimate to pursue the thought and this is being done in various laboratories. Meanwhile, it seems wise and sound to take the position that sterilization of lesions by drugs has not been proved.

Treatment Principles

In sum, it may be said that even though the patient profits greatly from the use of specific drugs when they are needed and may experience an early halting of serious disease which in earlier days almost always led to chronic illness at best and early death at worst, his ultimate prospects of permanent recovery depend largely on other help which may be given him. Particularly they depend on the effect of rest treatment to build up his resistance for the long battle against the tubercle bacilli which survive in his tissues.

If resistance against infection has risen to a high level during treatment and the residuals of disease are small, the prognosis for permanent recovery is excellent. The recovery under drug treatment of patients whose resistance is poor usually is followed sooner or later by relapse. However, surgical removal of the grossly damaged tissue, if practicable, may effectively turn the balance in such a patient's favor. Obviously, therefore, each case must be considered according to its individual features.

Certainly, a most important principle is to treat the patient with recently developed and limited tuberculosis promptly and sufficiently long to prevent extensive destruction of tissues and chronic disease and to insure the best prospect of permanent recovery. Many of these patients have no symptoms, and their disease is discovered in case-finding surveys or in other routine examinations. Although the rest cure alone has been effective in a great majority, the time required has been long, often a year or more. Now, although recovery may not be speeded greatly by drugs, their use when needed should help assure a permanent arrest of the disease almost uniformly; only a few of such patients will require surgery.

In the more advanced and active cases, reliance is now placed chiefly on the immediate and prolonged use of combined drug therapy to gain early control of the infection and to permit resolution of inflammatory changes. Mechanical procedures such as thoracoplasty and artificial pneumothorax are usually reserved for mechanical problems such as residual unhealed cavities in the lungs. Similarly, surgical resection is preferably reserved for the time when the disease has been brought under control and the remaining problem is the threat of relapse. During this time of waiting, it is to be hoped that the resistance of the patient may rise to a maximum level under treatment so that the permanence of his recovery may be improved or assured.

Another debatable question is the place of the so-called ambulatory treatment. If this could be shown to be adequate, the obvious advantages are that the huge cost of hospital care would be reduced, the patient's morale possibly would be improved, and the patient would not suffer the usual heavy social and economic losses. It is questionable whether these theoretical advantages can be achieved without paying the price of frequent relapse or of long chronic disease

leading to disability and eventually to death. Certainly, the matter should be approached objectively. Almost every conceivable treatment of tuberculosis has been applied in the past to the ambulatory patient. The early favorable response frequently is deceptive, and the opportunity to bring about a permanent recovery is easily lost.

Patients as Sources of Infection

Tuberculous patients with long-established chronic disease who circulate and act as sources of infection in the community represent a serious situation everywhere. As life is saved or prolonged by treatment, the death rate drops but the number of living patients continues to be high, and in fact, rises in some groups, particularly elderly men. Since many of these patients are destined for continuing chronic and eventually fatal disease, the problem of eliminating the source of infection short of the death of the patient must be considered. Giving drugs and thus drying up pulmonary cavities appeals to the imagination as a practical public health measure, and studies of this possibility are under way.

Here again, the only reasonable attitude is an objective one. Thus far, no combination of drugs has proved permanently adequate in preventing open cavitary lesions from discharging bacteria. Furthermore, when a dry cavity again becomes wet and starts discharging and the patient again starts coughing, he may be spreading drug-resistant strains which, when they infect a previously uninfected person, may produce disease which will not be amenable to drug therapy. The hope would be to circumvent this by resorting to different series of drugs, but the practical feasibility of this course is at best open to debate.

Prospects for the Future

In view of our better understanding of the various modes of treatment and of the outlook for the discovery of new drugs, the future holds brightening prospects for the tuberculous patient. To indulge in the hope of eventually finding an absolute and final cure of the disease would be idle at this time. The methods of study and investigation promising to lead to further knowledge are well known, but the time they require is necessarily long. One thing is certain, though: Progress will be made in laboratories and clinics like those of the Henry Phipps Institute, and the scientists who will achieve that progress will be of the same sterling character as that group at the Phipps which has given it such an illustrious past. We place in their hands, and in those of similarly competent and devoted workers, the privilege and responsibility of coming to grips with the almost limitless problems that remain.

Institute for Federal Hospital Administrators

The seventh Inter-Agency Institute for Federal Hospital Administrators will be held at the Walter Reed Medical Center, Washington, D. C., from October 26 through November 13, 1953. Participating in the institute will be key hospital administrators of the Army, Navy, Air Force, Veterans' Administration, Public Health Service, and the Bureau of Indian Affairs.

Speakers from Government agencies, schools of public health, and university departments of hospital administration will lecture and hold discussion sessions. Individual hospital problems will be analyzed.

International Certificates Of Vaccination

A revision of the immunization form required for international travel was made available in July 1953 by the Public Health Service.

Titled "International Certificates of Vaccination," and approved by the World Health Organization, the revised form provides travelers with a record of their compliance with the vaccination requirements of all nations governed by the International Sanitary Regulations. It contains certificates for vaccination or revaccination against smallpox, cholera, and yellow fever and has space for recording other immunizations such as typhus, typhoid-paratyphoid, plague, and tetanus. The principal changes are:

Smallpox and cholera certificates must bear the approved stamp called for on the certificates. The signature alone of the certifying officer is not acceptable, nor does it make the certificate valid. (In the United States, the approved stamp is that of the local or State health department in the area where the immunizing physician practices, of the Department of Defense, or of a designated yellow fever vaccination center, or it may be the seal of the Public Health Service. If the local health officer does not have an identifying stamp, undoubtedly the State health officer can validate the certificate.)

Only the primary vaccination for smallpox must be inspected and the results recorded. On revaccination, the smallpox certificate is immediately valid, whereas previously a 14-day wait was required.

The cholera certificate becomes valid beginning 6 days after the first injection or immediately in the instance of revaccination. Previously, the entire injection series had to be completed before the certificate became valid. (In the United States, two injections are given for the initial series. Travelers are advised to take the second inoculation because the type of vaccine used in this country provides maximum protection only after the second injection.)

The period of validity for the yellow fever vaccination certificate has been extended from 4 to 6 years. (In the United States, yellow fever vaccination certificates are valid only when the inoculation is obtained from a yellow fever vaccination center designated by the Public Health Service. The international regulations require a nation to designate specific vaccination centers for this purpose and to use vaccine approved by the World Health Organization.)

The text is printed in both English and French, but entries may be completed in either language.

The new form is distributed with all passport applications issued by the clerks of the court in any city in the United States and by the passport agencies of the State Department in Boston, New York City, San Francisco, New Orleans, Chicago, and Washington, D. C. It may also be obtained from local or State health departments and from Public Health Service facilities. It is identified by number as PHS–731, revised November 1952. Copies may be purchased from the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C., for 5 cents each, or $2.50 a hundred.

Travelers to countries where passports are not needed but where immunization is required may also obtain the form from the above sources.

Although the new form replaces the previous International Certificate of Inoculation and Vaccination, the old form will be acceptable in international travel until the expiration date of recorded examinations. Also, agencies still holding stock of the old form may continue to distribute it until the supply is depleted. Inquiry concerning use, distribution, and availability of the new form and restrictions on the use of the old certificate should be directed to the Division of Foreign Quarantine, Bureau of Medical Services, Public Health Service, U. S. Department of Health, Education, and Welfare, Washington 25, D. C.

Prepared by the Division of Foreign Quarantine, Bureau of Medical Services, Public Health Service.

Distribution of Hospital Nursing Services

By HELEN G. TIBBITTS, M.A.

THE NEED FOR more nurses in hospitals is a familiar problem. As a result, sometimes hospital beds have been closed, but more often the available nursing services have been spread more thinly over the existing patient load. The American Hospital Association reports that at the end of 1951, nearly 14,000 hospital beds were closed for lack of personnel and that job vacancies existed for 22,486 graduate nurses (*1*), 10 percent of the total number already employed in hospitals. These data, collected by the American Hospital Association, cannot be used to show the amount of nursing care patients are receiving, but data from the 1951 American Medical Association's census of registered hospitals can be used for this purpose, and so round out the picture.

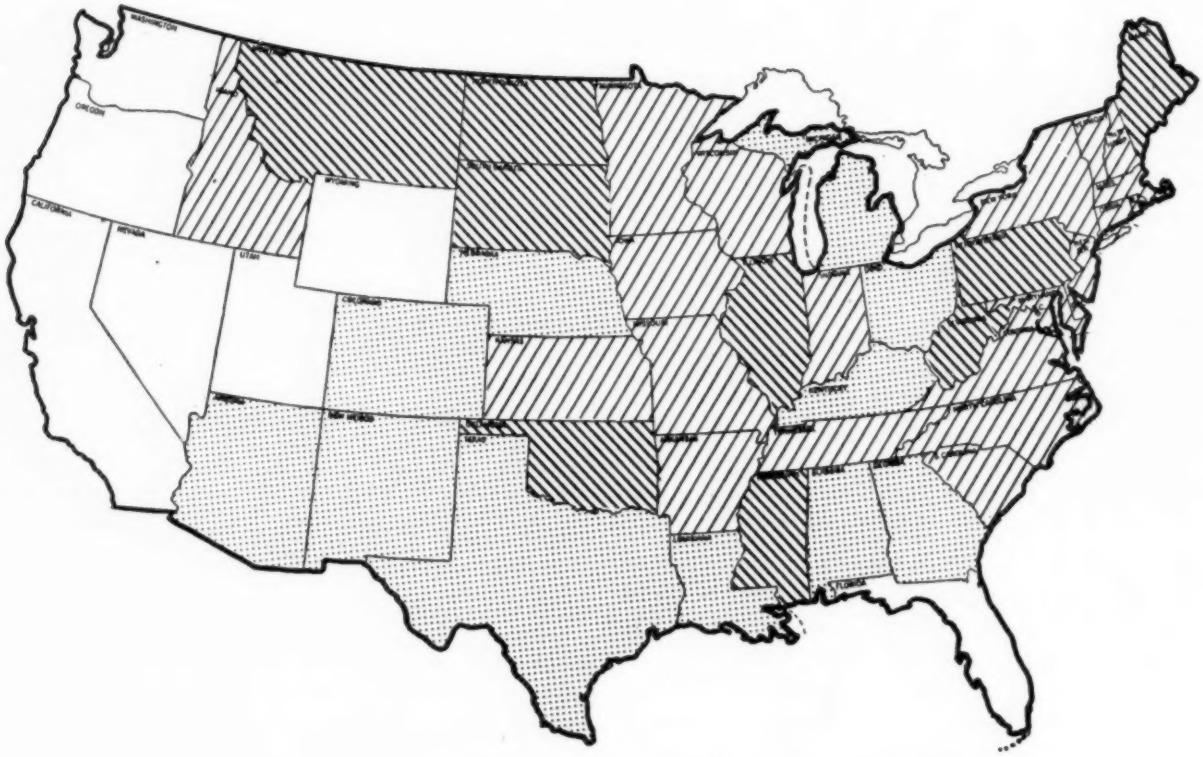
The American Medical Association has made available to the Public Health Service unpublished data on patient census and nursing personnel, which show the geographic locations and hospital types in which those patients are concentrated who are receiving less care than the nursing profession's standards recommend. Such standards have been set forth for three distinct types of hospitals: general and allied special, nervous and mental, and tuberculosis. For general and tuberculosis hospitals the standards are in terms of hours of care per patient-day, and for mental hospitals they are in terms of a nurse-patient ratio. While the nursing profession recognizes that these standards are not based on adequate data, they are the only guidelines available at this time. The standards are in fairly general use pending the results of studies now under way or contemplated.

Nurse-patient ratios have been computed for each type of hospital from data supplied by the the American Medical Association. The nursing personnel included in these ratios are limited to nurses available to give direct care to patients. General duty nurses are the only professional nurses included. The nonprofessional personnel include practical nurses, attendants, nurses' aides, and orderlies. The care given by student nurses is excluded from the nurse-patient ratios developed from the American Medical Association data. The personnel counts are as of a particular day in October 1951, while the number of patients was counted as the daily average patient census for the most recent 12-month period for which data were available at that time. An adjustment is made for part-time general duty nurses so that personnel counts would be on a full-time basis. No adjustments are made for care given by private duty nurses, and to offset this, no adjustments are made for newborn census.

The ratios computed from the data for hospitals registered by the American Medical Association have been converted by a very simple process into estimates of average hours of care received by patients: For hospitals whose nurses work an average of 44 hours a week and 48 weeks a year, the average hours of care per patient-day is one-seventeenth of the number of nursing personnel per 100 patients. For hospitals that average a 40-hour week, the average hours of care is one-nineteenth of the ratio. For example:

Mrs. Tibbitts was statistical analyst with the Division of Nursing Resources at the time this study was made. She is now with the Health Resources Staff of the Office of Defense Mobilization.

Figure 1. Estimated daily hours of total nursing care per patient in nongovernmental general hospitals, 1951.



Estimated Daily Hours of Care 44-Hour Work Week

4.1+	3.8 - 4.0	3.2 - 3.7	-3.2

In States where nurses work 40 hours a week, each nurse works 1,920 hours per year (40×48). The number of patient-days per year is the product of 365 multiplied by the daily average patient census. If we let R stand for the number of nursing personnel per 100 patients, C stand for the average hours of care per patient-day, NP for the total number of nursing personnel, and $DAPC$ for the daily average patient census, the following relationships can be stated:

$$(1)\quad R = \frac{100NP}{DAPC} = 100\,\frac{(NP)}{(DAPC)}$$

$$(2)\quad C = \frac{1920NP}{365DAPC} = \frac{1920}{365}\,\frac{(NP)}{(DAPC)}$$

$$(3)\quad \frac{R}{100} = \frac{NP}{DAPC} \text{ (from } 1 \text{ above)}$$

$$(4)\quad C = \frac{1920}{365} \times \frac{R}{100} = \frac{R}{19}$$

Data are shown in this report in terms that make them comparable to professional standards for nursing service for each of the three types of hospitals. Comparisons are made between the staffing of Federal hospitals, other governmental hospitals (includes those administered by the Bureau of Indian Affairs), and nongovernmental hospitals for each of the three types of service. Where figures are quoted in terms of hours of care given, they are based on the assumption that nurses in Federal hospitals work a 40-hour week and that nurses in other hospitals average a 44-hour week.

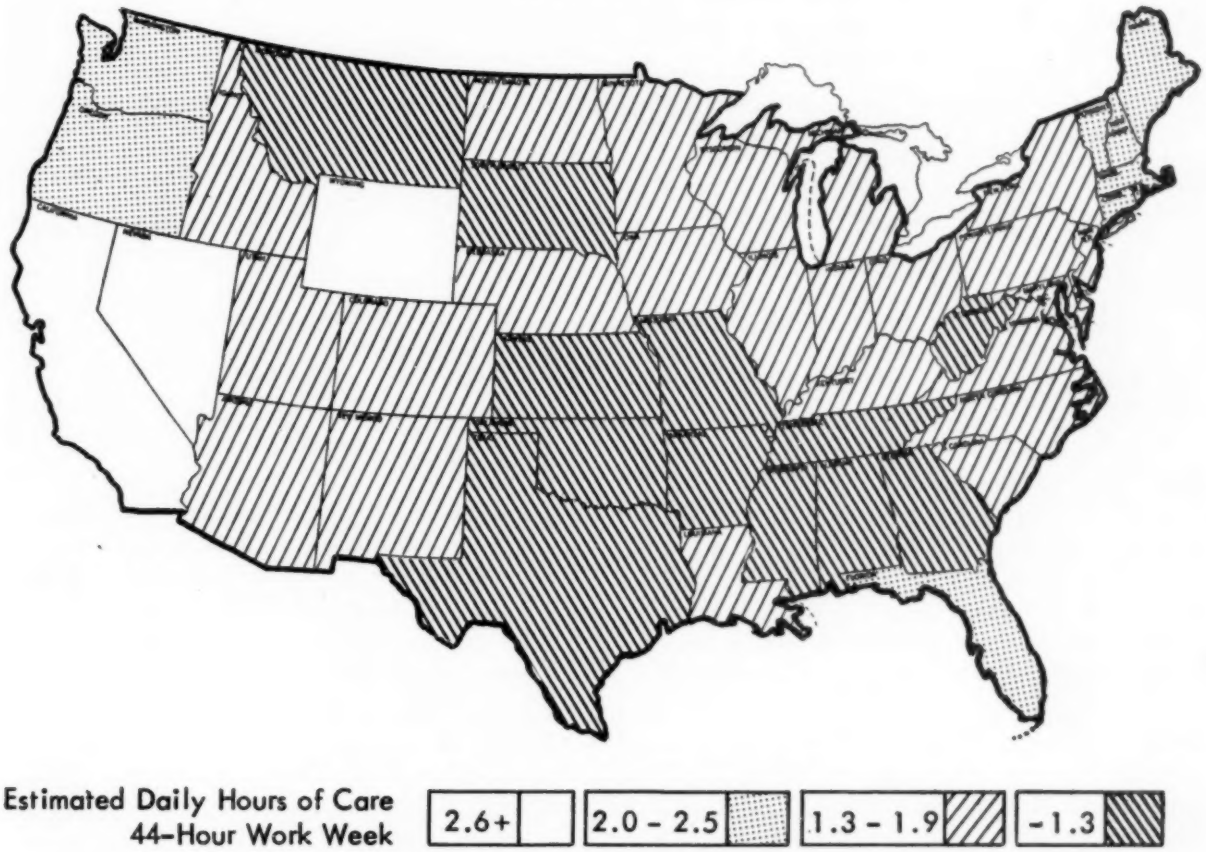
General and Allied Special Hospitals

The variations in hours of nursing care per patient-day available in hospitals under different types of control and the number of patients affected are as follows:

Control	*Patients (in thousands)*	*Hours of care* [1]	
		Total	*Professional*
Federal	96	2.1	0.7
Other governmental	119	2.8	.9
Nongovernmental	294	3.6	1.6

[1] Reference 9.

Figure 2. Estimated daily hours of professional nursing care per patient in nongovernmental general hospitals, 1951.



This picture of the situation in general hospitals shows that patients in Federal hospitals and those in other governmental hospitals are receiving not more, but actually less, nursing care than are patients in nongovernmental hospitals.

The average length of stay of patients in Federal hospitals is about three times as long as in nongovernmental hospitals. Long-term patients usually need less nursing care than short-term patients. However, obstetrical cases make up about one-fifth of the admissions to nongovernmental hospitals and only one-fifteenth of the admissions to Federal hospitals, and such cases are characterized by shorter than average stay and less than average acuity. Furthermore, in Public Health Service hospitals (data are not at hand for other Federal hospitals), the median length of stay is only about one-half the average stay; and of the 80 percent of patients who are discharged in less than 1 month the average stay is considerably less than one-half the average stay of all patients.

If an adjustment were made for the care given by student nurses, the difference between the amounts of nursing care available to patients in governmental hospitals of both types and those in nongovernmental hospitals would be more pronounced.

Information from other sources indicates that on a national basis student nurse care averages about 0.5 hour per day for each patient in general hospitals, and that 86 percent of it is concentrated in the nongovernmental hospitals. The breakdown of these figures follows:

State surveys made by the Division of Nursing Resources, Public Health Service, corroborated by evidence from the 1950 list of State Approved Schools of Nursing, indicate that a student nurse gives care to patients .4 as many hours as a graduate nurse employed on a full-time basis by the hospital. This means that the 102,500 students enrolled on January 1, 1951, were spending as many hours giving care to

patients as 41,000 full-time nurses employed by the hospitals, or 86,592,000 hours a year, based on average personnel policies in nongovernmental hospitals. The 509,446 patients in general and allied special hospitals received 185,947,790 days of care in the year, or .47 hours per patient-day from student nurses.

The concentration of student care in nongovernmental hospitals can be inferred by the control of the hospitals operating the schools in which the students are enrolled. Of the 97,903 students reported in Facts About Nursing to have been enrolled in schools of nursing January 1. 1950, 13,561 were enrolled in schools operated by Federal, State, city, county, or city-county hospitals. The control of the hospitals with schools was determined from the list of hospitals registered by the American Medical Association, and their enrollments from the 1950 list of State Approved Schools of Nursing.

A conservative estimate is that patients in nongovernmental hospitals probably average .4 hour of care daily by student nurses, which brings the total hours of care they are receiving up to 4 a day, about one-half of it being professional.

The average staffing of nongovernmental hospitals, computed by totaling personnel and patients in this entire group of hospitals, appears to meet the standards set by the nursing profession in 1948 with respect to total hours of nursing care although not in number of professional nursing hours. A study published by the National League of Nursing Education in that year indicated that each patient should have 3.5 hours of care per day, with 2.4 of these hours provided by professional nurses (*7*).

A more recent study indicates that under specified conditions of assignment and supervision professional care may be sufficient if it is one-third of the total (*6*), and another shows that patients on active medical and surgical service require 3.9 hours of care (*10*). A definitive study is needed now to relate amounts of nursing service to the demands of modern medical practice, but in the last analysis each hospital has, and will continue to have, different requirements.

The staffing ratios presented here are averages for large groups of hospitals; and hence, as would be expected, many hospitals in any group will have ratios lower than the group average. The extent to which nongovernmental hospitals fail to meet the standards of the nursing profession for general hospitals is sketched in briefly following the discussion of geographic variations.

Nervous and Mental Hospitals

Patients are distributed among the three classes of nervous and mental hospitals in inverse relationship to the amounts of nursing care available:

Control	Patients (in thousands)	Nursing personnel per 100 patients [1]	
		Total	Professional
Federal	60	26. 2	2. 9
Other governmental	621	11. 5	. 3
Nongovernmental	17	33. 9	4. 2

[1] Reference 9.

In contrast to the situation in general hospitals, patients in Federal mental hospitals are receiving considerably more care than patients in other governmental hospitals. It remains true that patients in nongovernmental mental hospitals are receiving the most care.

The standard approved by the American Psychiatric Association in 1945 for staffing mental hospitals called for 4 professional nurses per 100 patients, and 25 nonprofessional nursing personnel (*4*). The great majority of mental patients in the hospitals operated by States and other local governments thus is receiving less than one-tenth the professional nurse care and only two-fifths of the total amount of care considered essential.

While on the face of it, the average staffing ratios of nongovernmental mental hospitals appear to meet the standards quoted, it must be realized that these hospitals generally are undertaking intensive therapy for a much larger proportion of their patients than the State mental hospitals for which the standards were designed. The American Psychiatric Association has since developed a more discriminating set of standards, but they can be used only in a situation in which something is known of the condition of the patients in addition to their total number (*3*).

Tuberculosis Hospitals

The patient with tuberculosis receives the most care in a Federal hospital, and the least care if he is in a nongovernmental hospital:

Table 1. Average hours of nursing care by all type s of nursing personnel, except student nurses, per patient-day and distribution of hospitals according to actual hours provided: nongovernmental general hospitals in 8 States

State	Average hours	Hospitals distributed by actual hours care					
		Total	Less than 2.0	2.0–2.9	3.0–3.9	4.0–4.9	5.0 and over
Arizona	4. 3	11		1	3	3	4
District of Columbia	4. 2	12		1	5	5	1
Maine	3. 2	28	3	3	12	7	3
Nebraska	3. 9	71	1	11	25	12	22
New Mexico	3. 8	18	1	4	6	2	5
South Dakota	2. 9	35	2	6	15	7	5
Vermont	3. 4	18	1	6	3	6	2
West Virginia	3. 1	48	2	8	21	14	3

Control	*Patients (in thousands)*	*Hours of care* [1]	
		Total	*Professional*
Federal	8	1. 8	0. 6
Other governmental	58	1. 4	. 2
Nongovernmental	8	1. 2	. 2

[1] Reference 9.

On the basis of standards of the Tuberculosis Advisory Nursing Service, even the better staffed Federal tuberculosis hospitals are short of professional nurses (*5*). These standards are based upon the regimen prescribed for patients, that is, whether the patient is on strict bed rest, bed rest, or is semiambulant, or ambulant. To obtain a single figure from these four standards so that comparison could be made with existing staffing practices, the nursing requirement of patients in each category was weighted by the probable proportion of all patients in the category. The weighted average nursing requirements of tuberculosis patients amounts to a total of 1.8 hours of care per day, .9 hour of which should be professional nurse care.

Geographic Variations

All of the figures cited so far have been national averages. It is reasonable enough to use national averages when discussing Federal hospitals since their centralized administration means that there is relatively little local variation in staffing ratios.

What justification is there, however, for computing a single ratio by combining data for 48 States from Arkansas to Maine and from Georgia to California? A comparison of the ratios for nongovernmental general hospitals across the country suggests part of the answer (*9*). Figure 1 shows some geographic variations in the ratios of total nursing personnel to patients. The ratios have been grouped into

Table 2. Average hours of care by graduate nurses per patient-day, and distribution of hospitals according to actual hours provided: nongovernmental general hospitals in 8 States

State	Average hours	Hospitals distributed by actual hours care					
		Total	Less than 2.0	2.0–2.9	3.0–3.9	4.0–4.9	5.0 and over
Arizona	1. 9	11	1	3	3		4
District of Columbia	2. 2	12		4	3	5	
Maine	2. 0	28	6	3	2	5	12
Nebraska	1. 5	71	14	16	22	11	8
New Mexico	1. 6	18	3	8	2	2	3
South Dakota	1. 1	35	12	8	5	5	5
Vermont	2. 2	18	1	3	2	5	7
West Virginia	1. 1	48	14	22	8	4	

Table 3. Nongovernmental general hospitals with schools of nursing distributed according to hours of care provided per patient-day by student nurses in 8 States

State	Total hospitals	Hours care by student nurses				
		Less than 1.0	1.0–1.4	1.5–1.9	2.0–2.4	2.5 and over
Arizona	5		1	3	1	
District of Columbia	5	4		1		
Maine	4		2	2		
Nebraska	12	5	4	3		
New Mexico [1]						
South Dakota	9		5	2	2	
Vermont	6	2	2	1	1	
West Virginia	19	5	7	6	1	

[1] Only one hospital operates a school of nursing, and to avoid disclosing confidential information, data are not shown.

four classes for mapping purposes. The States with the lowest ratios have fewer than 55 nursing personnel of all types available to care for each 100 patients. This means that in these States if nurses work 44 hours per week, patients can receive an average of less than 3.2 hours of care per day. Patients in the next higher States can receive 3.2 to 3.7 hours; in the next to the highest group of States they can receive 3.8 to 4.0 hours, and in the highest States, 4.1 hours or more are available.

Figure 2 shows similar variations in graduate professional nurse to patient ratios. In the States with the lowest ratios, fewer than 22 graduate professional nurses care for each 100 patients. That is, patients in these States can average less than 1.3 hours professional nurse care each day. Patients in the next group of States can average 1.3 to 1.9 hours professional nurse care daily, in the next higher group, 2.0 to 2. 5 hours, and in the most privileged States they can average 2.6 hours or more.

Interhospital Differences

It cannot be inferred that a State whose average nurse-patient ratios provide for amounts of care that meet professional standards has all the nurses it needs in its hospitals. Nurses are not distributed among all hospitals in proportion to the number of their patients, and no assumption is made that this should be so (tables 1 and 2). Admittedly, the patients in some hospitals need more care while those in other hospitals may need less, depending upon the conditions for which they are being treated, the nature of the treatment, and the hospital's program.

The safest assumption probably would be that the patients in any general hospital need at

Table 4. Hospitals distributed according to total hours of care provided per patient-day, including care given by student nurses: nongovernmental general hospitals in 8 States

State	Total hospitals	Total hours care				
		Less than 2.0	2.0–2.9	3.0–3.9	4.0–4.9	5.0 and over
Arizona	11		1	3	3	4
District of Columbia	12			6	5	1
Maine	28	2	4	9	7	6
Nebraska	71	1	7	22	18	23
New Mexico	18	2	4	6	2	4
South Dakota	35	2	8	12	8	5
Vermont	18		1	8	7	2
West Virginia	48	2	11	20	10	5

least the amount of care that would be equivalent to the nursing profession's 1948 standard for total hours of care and Bredenberg's standard for hours of professional nurse care. The corollary of this assumption is that hospitals providing more hours of care than this do so either because of the kind of care their patients need, out-of-date facilities for care, awkward administrative procedures, educational programs for student nurses or medical students, or for a variety of other possible reasons. Thus, in Nebraska, although the State average meets professional standards for total hours of care, at least 12 hospitals could be considered inadequately staffed.

Differences in the extent to which student nurses give patient care show up in table 3. Table 4, when compared with table 1, shows how including the care given by students in the total hours affects the picture of the amount of care patients are receiving.

Summary

1. The ratio of nursing personnel to patients in the entire group of nongovernmental general hospitals in the country is sufficient to provide an average of 3.6 hours of care, 1.6 hours of this being professional. Nevertheless, numerous hospitals in every State need more of both categories of nurses even where statewide ratios are at the national average. Only in the Pacific coast States and in Nevada, Wyoming, and Florida do patients in general hospitals appear to be receiving an average amount of both professional and nonprofessional nursing care that is up to minimum professional standards. In the New England States the average amount of professional nursing care appears to be sufficient, but hospitals in this area perhaps should employ more nonprofessional nursing personnel. In all of the remaining States there appear to be too few graduate nurses in the general hospitals.

2. All general hospitals under governmental control of any sort appear to be short of both professional and nonprofessional nursing personnel, although the longer average length of stay in Federal hospitals modifies the picture to some extent.

3. In the mental hospital field, only those under nongovernmental auspices come close to meeting the staffing standards of the nursing profession, and these hospitals care for only 17,000 of the 698,000 patients in this kind of institution.

4. Tuberculosis hospitals in all three classes appear to be grossly understaffed with respect to both professional and nonprofessional nurses.

REFERENCES

(*1*) Statistical guides. *In* Administrators Guide Issue, part 2. Hospitals **26**: 1–31 (June 1952).

(*2*) American Nurses Association: Facts about nursing. New York, 1952.

(*3*) American Psychiatric Association: Standards for psychiatric hospitals and clinics. Washington, D. C., 1951.

(*4*) Standards for psychiatric hospitals and outpatient clinics. Am. J. Psychiat. **102**: 164–269 (1945).

(*5*) Tuberculosis Advisory Nursing Service of the National League for Nursing: Cues to staffing tuberculosis units in hospitals. New York, National Tuberculosis Association, 1952, 28 pp.

(*6*) Bredenberg, Viola: Nursing service research. Philadelphia, J. B. Lippincott Company, 1951, 170 pp.

(*7*) National League of Nursing Education: A study of nursing service in one children's and 21 general hospitals. New York, 1949.

(*8*) National League of Nursing Education: State approved schools of nursing. New York, 1950.

(*9*) Tibbitts, Helen G., and Levine, Eugene: Health manpower source book. Part 2. Nursing personnel. Washington, D. C., U. S. Government Printing Office 1953, 88 pp.

(*10*) Wright, Marion J.: Meeting the need for nursing personnel. *In* Administrators Guide Issue, part 1. Hospitals **26**: 49–51, 76–78 (June 1952).

Occupational Disease Reporting

By VICTORIA M. TRASKO

THE STUDY and control of occupational diseases in the United States has progressed markedly in the past four decades. A vast body of information, both clinical and toxicological, has been developed, particularly on such diseases as silicosis, dermatoses, and poisoning due to lead, benzol, beryllium, and hundreds of other toxic substances. Scientific knowledge concerning the environmental control of these diseases is likewise well developed, although its application is yet far from universal. An exception to these notable gains has been the ineffectual attempt to obtain adequate morbidity data on occupational diseases.

The value of universal morbidity statistics on diseases, whether communicable, chronic, or occupational, is unquestioned in public health planning, in developing control programs, and in aiding the passage of pertinent legislation. Though incomplete, statistics based on early pioneering studies of occupational diseases and general sickness have been sufficiently impressive to interest governmental agencies and other groups in the improvement of working conditions and in raising the health level of workers. In fact, the recognized prevalence of silicosis and its association with tuberculosis was one of the main reasons for the establishment by the Public Health Service of an "office of industrial hygiene and sanitation" in 1914.

Despite their limitations, occupational disease statistics have also influenced the adoption of legal measures to control the use of toxic substances known to cause illness among exposed workers, and to regulate general working conditions. Beyond that, however, the absence of reliable data on the prevalence of occupational diseases has made impossible a definition of the overall industrial disease problem and a reasonable determination of where toxicological and clinical research is needed.

Industrial hygienists have long recognized this hindrance, and representatives of State and local industrial hygiene units, medical directors of private industries, representatives of insurance companies, and others have, for many years, urged the Division of Occupational Health of the Public Health Service to undertake a study of the prevalence and reporting practices of occupational diseases in the United States. Finally, because of the long-sustained need and in view of the fact that the situation was remaining static, such a project was undertaken in 1949.

One of the phases of this project dealt with a review of the status of required reporting by physicians to State and local agencies. The second phase dealt with an experimental pilot study originally undertaken to test the feasibility of developing a national reporting system for occupational diseases. In addition, the project has also encompassed the collection of all available statistics on occupational diseases.

Miss Trasko, public health adviser to the Division of Occupational Health, Public Health Service, and a member of the division's staff since 1938, has had varied experience in industrial hygiene activities in this country and South America.

This paper is based on Public Health Service Publication No. 288, Occupational Disease Reporting—A Review of Current Practices, Together With a Collection of Incidence Statistics, also by Miss Trasko. Detailed analyses of the information presented in this article will be found in the full publication, now in press.

Required Reporting of Occupational Diseases

An accepted method of obtaining information on the incidence of diseases is through required or universal reporting by practicing physicians. While a fair degree of success may have been experienced through the reporting of communicable diseases, required reporting on the whole is not considered an effective device. For occupational disease statistics and prevention purposes, this method has produced discouraging results.

The idea has been expressed that required reporting will never be successful unless it is associated with reasons other than that of collecting statistics (*1*, *2*). The administration of workmen's compensation laws in this country provides this incentive, since the reporting of essential information concerning the cause and nature of accidents and diseases is required of the physician, employer, and worker before benefits can be paid for the disability incurred. There is no doubt that reporting for compensation purposes is more successful, at least quantitatively, than compulsory reporting, despite the relatively long reporting experience in this country and the fact that more than one-half of the States require reports.

At the present time, 27 States have legislation or regulations requiring physicians to report one or more occupational diseases to health or labor authorities. According to available information, several States, including New York, Michigan, and Wisconsin, passed their first laws in 1911. The Maryland law was first enacted in 1912; the New Hampshire law, in 1913; and the Rhode Island law, in 1915. Ohio requires reports to both the State department of health and the industrial commission. The department of health law dates to 1913 and the industrial commission law, to 1921. While many of these earlier laws have been revised and broadened, a few are still in force in their original forms. About one-half of the 27 States that now have laws or regulations enacted them after 1936, when the passage of the Social Security Act made funds available for the establishment of public health programs, including industrial hygiene. These reporting laws were passed to facilitate the efforts of the State industrial hygiene agencies in obtaining occupational disease reports for investigative purposes.

Many reasons are attributed to the ineffectiveness of required notification of occupational diseases. Among these are difficulties of recognition and diagnosis. Limited knowledge of occupational diseases, of industry itself, and of materials handled and manufacturing processes involved contribute to lack of reporting. Moreover, it is probable that many physicians are of the opinion that reporting occupational diseases violates the confidence of the physician-patient-employer relationship. Other factors are lack of standardization, nonenforcement, and other shortcomings of the laws themselves.

Reportable Diseases

Contrary to the practice in communicable disease reporting, there is no standardized pattern among the States for occupational disease reporting. For instance, all occupational diseases, with or without definitions and qualifications, are reportable in eight States (Georgia, Louisiana, Massachusetts, Michigan, Mississippi, Montana, South Carolina, and Utah). In six States (Alabama, Arkansas, Colorado, Iowa, Missouri, and New Mexico) the reportable diseases are named. In Arkansas, the list corresponds to the schedule of compensable diseases covered by the State workmen's compensation law; in the other five States, the list bears little or no resemblance to the schedules, since most reporting laws were passed before occupational diseases became compensable. In two States, New Jersey and Pennsylvania, the compulsory reporting is limited to lead poisoning.

Reporting laws in the remaining 11 States appear to be patterned after the British Factory and Work Shop Act of 1895, which requires reporting by the medical practitioner of anthrax, and of poisonings by lead, phosphorus, and arsenic (*3*). New York and Wisconsin seem to have used this basic pattern, later adding mercury poisoning and compressed air illness to the list. The laws in the other nine States (Connecticut, Kansas, Kentucky, Maine, Maryland, Minnesota, New Hampshire, Ohio, and Rhode Island) follow the New York-Wisconsin pattern but have added poisoning due to brass and wood alcohol, and conclude with

the phrase "any other disease contracted as a result of the nature of employment."

An interesting reporting device used by Ohio, Missouri, Pennsylvania, and New Jersey is a law which requires that physical examinations be made periodically of workers exposed to certain toxic substances, and that all cases of poisoning thus found be reported both to the State health and the State labor authorities. In Ohio, New Jersey, and Pennsylvania the law applies to exposure only to lead and its compounds; in Missouri, the law is more inclusive and covers exposures encountered in the manufacturing or processing of antimony, arsenic, brass, copper, lead, and other substances.

Recipients of Reports

Another shortcoming which possibly bears on the limited success of current reporting is the lack of uniformity as to whom the reports are to be made. Legal provisions in 17 States require that reports be made to the State health officer; in 2 of these States, the local health officer is also mentioned. In 6 States, the local health officer is named as the exclusive recipient. Experience has shown that unless the local health department has its own occupational health program there is less chance that reports of occupational diseases will be made, since the incentive to encourage reports is lacking. Moreover, the few reports that might be made directly to local health departments usually reach the State industrial health agency responsible for their investigation either late or not at all, or in a summary form along with other notifiable diseases.

In Ohio, physicians are required to report occupational diseases both to the State department of health and to the State industrial commission, in accordance with separate laws. In actual practice, however, the commission receives from physicians only those reports which involve claims. In two other States, Massachusetts and New York, physicians are required to report to the State department of labor. In New Jersey, Pennsylvania, and Ohio, separate statutes make lead poisoning reportable to both the State health and the labor authorities.

Several of the State laws provide for an exchange of reports. According to the Massachusetts law, copies of reports of occupational diseases made to the department of labor may be referred to the State department of health on request; in three States, Missouri, New Hampshire, and Ohio, copies of reports made to the State health department must be transmitted to the State labor authorities.

Extent of Present Reporting

A canvass of occupational disease reporting showed that slightly less than 1,800 cases of occupational diseases were reported by physicians to health departments during 1950 or 1951. Moreover, 1,695, or 94 percent, of these cases were reported by three States, Connecticut, Michigan, and Ohio, the rest being reported by Colorado, Kentucky, Minnesota, and Montana. Eighteen States with reporting laws received an occasional report or none at all. In fact, some of these States have never received an occupational disease report, despite continued efforts to solicit cooperation. New York and Massachusetts were not included in the above tabulations because they indicated that the reports received were too few to have any statistical significance.

A crude index of under-reporting by physicians in the past as well as at present is furnished by a few States that have kept continuous records of reports received, as contrasted with the number of occupational disease claims filed or awarded by compensation authorities. For example, in 1942, the Ohio Department of Health received 1,637 reports of occupational diseases from physicians (*4*). This figure may be considered fairly representative for the State, since it closely approximates the average number of reports that had been received annually by the department in the 10-year period 1928 through 1937 when 12,931 cases were reported (*5*). In contrast, the Ohio Industrial Commission in 1942 received 5,597 occupational disease claims for compensation. The contrast was further borne out in 1950, when the Ohio Department of Health received 482 reports from physicians and the industrial commission, 4,574 claims for compensation.

The experience in Minnesota shows similar discrepancies; 61 reports were made to the State health department in 1950, as contrasted with 1,931 cases of occupational diseases closed by the industrial commission. Michigan has had a

comparable experience. The State's present occupational disease reporting law was passed in 1937, also the date of the enactment of its occupational disease compensation legislation. Under this reporting law, according to the records of the division of industrial hygiene of the Michigan Department of Health, physicians made the following reports:

Year	Number cases	Year	Number cases
1939	1,110	1945	793
1940	1,034	1946	553
1941	1,482	1947	775
1942	933	1948	613
1943	2,742	1949	513
1944	1,358		

During the 2 years, 1950 and 1951, covered by the pilot study, 1,074 reports were received, including cases uncovered during field studies and not otherwise reported, as well as cases of silicosis reported as a result of general X-ray surveys. According to the biennial report for the fiscal years 1948–50, the Michigan Workmen's Compensation Commission received reports of 1,993 compensable industrial diseases. Although the 2-year periods are not the same, these figures likewise indicate a large degree of under-reporting by physicians.

In Connecticut, figures for the 1937 fiscal period showed that physicians reported 127 cases of occupational diseases; during the same year, compensation claims were paid for 286 cases which were not among those reported (*6*). Comparable data for more recent years are not available. However, as a result of checking physicians' reports against compensation reports, the Connecticut industrial health agency has found that many of the later occupational diseases, too, have not been reported as required by law. It should be pointed out that the experience in Connecticut is unique because the number of cases reported in 1951 increased instead of decreasing or remaining at the same level. The number of reports generally received from physicians averages 300 a year. However, as a result of more contact with physicians during the 2 years that the Connecticut Bureau of Industrial Hygiene participated in the pilot study, the number of cases reported went up to 749 in 1951. This development certainly suggests the possibility that compulsory reporting of occupational diseases might have some merit, if encouraged actively.

Reporting of occupational diseases to the State department of public health is not required by law in California, but this State's experience is cited to show the difficulty of drawing valid conclusions from State statistics on occupational diseases. According to the interpretation of the State Workmen's Compensation Act, all illnesses arising out of conditions of employment are defined as injuries. As such, they are compensable and legally reportable to the California Department of Industrial Relations by both employers and physicians. Of special interest here are reports made by physicians of all injuries they treat which result in a disability of 1 day or longer or require medical treatment other than first aid. The department of industrial relations has been referring all occupational disease reports of this type to the bureau of adult health of the California State Department of Health for more than 15 years. The volume of reports of occupational diseases made and referred surpasses that of any other State in the country. Annual tabulations of the bureau show that for the 1939 fiscal year, 4,231 reports of occupational diseases were tabulated; during the calendar year 1944, the number was 11,893; during 1949, it was 12,536; in 1950, 12,245; and in 1951, 14,777. Between 50 and 55 percent of the cases referred were dermatoses.

To what extent this continuing rise in the number of cases reported represents a real increase in the occupational disease problem is difficult to say. No doubt, increased compensation benefits, improved methods in handling reports, and selectivity of cases falling into occupational disease categories are factors reflecting improved figures. On the other hand, California has experienced a tremendous upswing in industrialization and, as a consequence, an increase in the labor force. This growth undoubtedly has contributed to a potentially greater problem with respect to some occupational health conditions.

The Pilot Study

The pilot study represents the only known effort at uniform collection of occupational dis-

eases over a period of time, involving a group of States with various methods of obtaining reports. The pilot study was carried out in cooperation with divisions of industrial hygiene in 11 State health departments (Connecticut, Florida, Georgia, Indiana, Michigan, Missouri, New Hampshire, Oregon, South Carolina, Tennessee, and Wisconsin), selected to afford average representation of different reporting practices. The study covered the calendar years 1950 and 1951, during which time the participating States transmitted on special forms to the Division of Occupational Health, Public Health Service, individual reports of occupational diseases coming to their attention.

The pilot study was made to determine the feasibility of developing a nationwide reporting system on occupational diseases. Originally, it had been planned to consider only required reports from physicians. When it was determined, however, that few reports were being made by physicians, it became clear that a successful national reporting scheme would have to consider other sources of reports as well. The inadequacy of sole reliance on physicians' reports has been realized for a long time by State industrial health agencies, and they are presently depending on workmen's compensation agencies for reports of cases that occur in industry. Consequently, to reflect actual reporting practices in the States, the base of the pilot study was broadened to include reports referred from workmen's compensation authorities.

During the 2-year period covered by the study, 9,058 reports of occupational diseases were submitted by the 11 States. Of this total, 77 percent consisted of reports referred to the health departments by compensation agencies. Reports to health departments by physicians accounted for only 20 percent; the remaining 3 percent comprised reports of cases encountered or reported unofficially during investigations of occupational health hazards, reports of pneumoconiosis uncovered through mass X-ray surveys, and some reports of cases taken from death certificates.

The reports received may be considered typical of the kind of reports of occupational diseases being made today. The quality varied from State to State as well as within individual areas, depending on how the report originated. Differences cannot be ascribed to any one cause; they are due to many factors inherent in the recognition and reporting of occupational diseases. In general, physicians' reports were likely to be weak on etiology; employers' reports, on the nature of the disease. In many instances, better reports resulted when the information was abstracted from both employers' and physicians' reports. While omissions, inaccuracies, and incompleted items were found in all types of reports, they were observed more frequently in reports made in connection with claims for compensation than in others. Most unsatisfactory probably were statements on the cause or substance responsible for the occupational disease.

Occurrence in Companies

The 2 years covered by the pilot study afforded a good opportunity to observe the frequency with which cases are reported from the same plants over such a period. The distribution of companies according to the number of cases of alleged or suspected occupational diseases occurring per company, as reported by 10 States in the pilot study, is shown in table 1.

Three-fourths of the 3,654 companies reported one case, their total accounting for 36 percent of all the 7,590 reports. At the other extreme, 10 or more cases were reported by 2.2 percent of the companies and accounted for 29.7 percent of all the alleged diseases reported.

In Michigan, where physicians' reports made up the largest number, 18 companies were responsible for 703 cases. It is assumed that the

Table 1. Number and percentage of occupational disease cases occurring per company, pilot study, 1950–51

Number of cases occurring per company	Companies		Cases	
	Number	Percent	Number	Percent
Total	3,654	100.0	7,590	100.0
1 case	2,733	74.8	2,733	36.0
2 cases	461	12.6	922	12.1
3 cases	159	4.3	477	6.3
4 cases	79	2.2	316	4.2
5 cases	55	1.5	275	3.6
6 to 9 cases	86	2.4	611	8.1
10 cases and over	81	2.2	2,256	29.7

Table 2. Occupational disease cases reported by 13 companies in Michigan, pilot study, 1950–51

Company	Employment	All cases	Dermatitis	Hernia	Pneumoconiosis	Tenosynovitis
A	?	10	2	1	7	
B	21,500	199	199			
C	7,000	8			8	
D	?	40	37	2	1	
E	41,000	68	1	67		
F	12,000	22	21		1	
G	?	28	28			
H	7,500	11	2		9	
I	?	45	21		24	
J	20,000	20	2		18	
K	10,000	38	37		1	
L	75,000	83	7	1	75	
M	6,000	43	12	19		12

same person or persons in these companies made the reports, although there may have been exceptions. Data on employment were not furnished for all 18 companies, but most of them employ several thousand workers each and have their own medical departments.

The reporting experience of 13 of these Michigan companies, all manufacturing automotive transportation equipment, revealed that there is a distinct tendency for some physicians to report only one kind of occupational disease and other physicians another kind (table 2).

Moreover, there is little relation between the number of workers employed and the number of cases reported, regardless of the type of case. Company B with an employment of 21,500 workers reported 199 cases, all of which were dermatitis. Company E with 41,000 employees reported only one case of dermatitis and 67 cases of hernia. Company L with 75,000 workers reported 75 cases of pneumoconiosis, 7 of dermatitis, and 1 of hernia. Company M with 6,000 workers reported 12 cases of dermatitis, 19 of hernia, and 12 of tenosynovitis.

The suspected incompleteness and spottiness of required reporting of occupational diseases is substantiated by these figures. Since all 13 companies are engaged in the manufacture of transportation equipment, it would reasonably be expected that more or less the same types of occupational hazards would prevail, giving rise to similar types of occupational illnesses. Even if it were assumed that all operations were adequately controlled, dermatitis, hernia, and tenosynovitis would probably occur fairly universally among these industries. With respect to pneumoconiosis, however, the situation may be different since it is not known how many of the cases might have been reported by physicians in the plant and how many were picked up through mass X-ray surveys.

Incidence of Occupational Diseases

To obtain a more comprehensive picture of the nationwide occupational disease problem, the pilot study data for the 11 States covering the year 1951 only were supplemented by information from the annual reports of workmen's compensation commissions in 17 States not included in the pilot study. It was determined that in the 28 States there were 43,307 alleged or suspected occupational diseases reported in a 12-month period.

State differences in compiling statistics on occupational diseases made the summarization of this material difficult, and certain liberties had to be taken when classifying cases according to a diagnostic pattern. However, a rough classification according to diagnosis shows that diseases of the skin accounted for 54.3 percent of all occupational diseases. Systemic effects due to chemical agents accounted for 5.2 percent; dust diseases of the lungs, 4.6 percent; other respiratory disorders, 1.5 percent; disorders due to physical conditions, 9.5 percent; infective diseases, 2.7 percent; and miscellaneous conditions, 22.2 percent. Wide differences occurred in the number and kind of diseases reported from State to State, probably due in part to prevalence but in larger part to variations in legal provisions on compensation of occupational diseases and to technicalities in processing the data.

Conclusion

On the basis of the evidence presented, required reporting by physicians gives little promise of yielding national statistics on occupational diseases. In view of the long experience with required notification of occupational diseases, and the continuous inadequacy of resultant reports, the need is indicated for a

reevaluation of the principle as well as procedures of required medical reporting. On the other hand, reporting for compensation purposes offers some hope of obtaining general statistics on occupational diseases, provided that some of the obvious technical difficulties can be resolved.

A practical approach might be to suggest standards and procedures, similar to those developed by the American Standards Association on work injuries applicable to occupational diseases, which the workmen's compensation agencies and others could use as a guide and which would make more usable existing statistics on occupational diseases.

REFERENCES

(*1*) Dorn, H. F.: Methods of measuring incidence and prevalence of disease. Am. J. Pub. Health **41**: 271–278 (1951).

(*2*) Occupation and health. Encyclopedia of hygiene, pathology, and social welfare. Geneva, International Labour Office, 1934, vol 2, pp. 373–511.

(*3*) Legge, T. M.: Twenty years' experience of the notification of industrial diseases. J. Indust. Hyg. **1**: 590–596 (1920).

(*4*) Hayhurst, E. R.: Occupational disease considerations. Ohio State Bar Association Report **16**: 87–93 (May 10, 1943).

(*5*) Kistler, J. B., and Smith, K. D.: Occupational diseases in Ohio. Columbus, Ohio, Department of Health, 1938. Mimeographed.

(*6*) Sappington, C. O.: Medicolegal trends: Occupational diseases. A statistical and legal analysis of medicolegal experience. Chicago, 1938.

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Report of a Case Of Rat-Bite Fever Due to S. moniliformis

By Robert L. Griffith, M.D., and
Donald W. McNaughton, M.D.

REPORTS of only 51 bacteriologically proved cases of rat-bite fever caused by *Streptobacillus moniliformis* can be found in the United States through 1951.

Yet with our ever-present rat population, this disease must be considered in the differential diagnosis of obscure febrile illnesses as well as in illnesses following a rat bite. A history of the actual rat bite cannot always be obtained. The disease may be transmitted by any rodent and also by dogs and cats. Laboratory rats, as well as wild rodents, may harbor the organism. Most of the cases have occurred in children or in men whose occupations take them into rat-infested areas. There is also the possibility of the disease being spread by food, as in the 1926 milkborne epidemic in Haverhill, Mass. This epidemic was called Haverhill fever (epidemic arthritic erythema).

The case of rat-bite fever reported here occurred in 1952 in an 8-year-old Seattle boy who was bitten on the tongue by his pet white rat. The disease has previously been reported as being acquired from white rats by laboratory workers. It is the first known case reported from the State of Washington.

It is generally considered that rat-bite fever can be caused by two distinct organisms: *Streptobacillus moniliformis*, a normal inhabitant of the nasopharynx of rats, and the spirochete, *Spirillum minus* (the disease having been originally described in Japan and called sodoku) which is present in infected eyes of rats. Both organisms may be present in the same case.

Dr. Griffith is chief of medical services and Dr. McNaughton is clinical director of the United States Public Health Service Hospital at Seattle, Wash.

Occurrence of the Disease

Watkins (*1*) in a complete review of the disease in 1946 found a total of 184 cases of rat-bite fever reported in the United States. Of these, 39 cases were proved to be caused by *S. moniliformis* and 41 cases, by *S. minus*. Since 1946 two cases due to *S. moniliformis* have been reported from Massachusetts and one each from Connecticut, California, Delaware, Illinois, Maryland, Michigan, Minnesota, New York, Texas, and Wisconsin.

Until 1951 no proved cases caused by *S. moniliformis* had been reported in the United States west of Minnesota and Missouri, and no clinically diagnosed case had been reported in Canada west of Montreal. In that year, one case was reported from Los Angeles and two cases from Vancouver, British Columbia (*2*).

This geographic distribution is, no doubt, a matter of recognition and reporting, since there is no reason to believe this worldwide disease is new to western North America. Cases of rat-bite fever caused by *S. minus* have been reported from California and Oregon.

In describing the disease, it is desirable to specify the organism involved and whether it was caused by a rat bite or by some other means of entry into the body.

Diagnosis and Treatment

Clinically, rat-bite fever due to *S. moniliformis* is characterized by septic or relapsing fever and frequently by petechial or morbilliform rash and polyarthritis. The incubation period varies from 1 to 22 days, usually less than 10 days. The primary wound generally heals rapidly. There may be regional lymphadenopathy. Leukocytosis is usually present. About 16 percent of the cases have a false positive serologic test for syphilis. The diagnosis is confirmed by culture on special media and by animal or chick embryo inoculation of blood, joint fluid, or abscess material. Specific agglutination tests may be obtained in a few laboratories where the antigen is available. The titer usually reaches a peak between 1 and 3 months and may persist for 2 years. Specific skin tests may be positive for 4 to 5 months after the infection. Six deaths have

been reported due to this organism in the United States. The most significant findings at autopsy have been myocarditis, endocarditis, and pneumonia.

The disease caused by *S. minus* is remarkably similar clinically to that caused by *S. moniliformis*. The fever is more likely to be relapsing. The local ulcer tends to be more indurated. Arthritis is less common. Approximately 51 percent have false positive serologic tests for syphilis. *S. minus* may be recognized by darkfield examination or by animal inoculation.

Either penicillin or streptomycin is usually effective in the treatment of rat-bite fever caused by either of the organisms. However, one case due to *S. moniliformis* has been reported which responded to streptomycin after failing to respond to penicillin, and another case caused by the same organism was reported which was refractory to both of these antibiotics. It is advisable to perform antibiotic sensitivity tests on the organisms.

CASE REPORT

K. S., an 8-year-old white boy, was admitted to the United States Public Health Service Hospital, Seattle, April 28, 1952, with chills, fever, headache, and vomiting of 6 hours' duration. Four days prior to admission, the child had been bitten on the tongue by his pet white rat. Other members of the family were in good health.

On physical examination his temperature was 103° F., his pulse was 96 per minute, respirations were 22 per minute, and blood pressure was 110 mm. Hg systolic and 70 mm. Hg diastolic. He did not appear to be in acute distress. There were small petechiae around the mouth. There was a small ulcer on the left side of the tip of the tongue with a small area of induration around the ulcer and on the inferior surface of the tongue. The pharynx was moderately injected. Rhonchi were present in the right lower chest. A systolic apical murmur was heard on expiration only. The murmur had the quality of a functional murmur. Physical examination was otherwise normal.

The roentgenogram of the chest at admission was negative. The day following admission the leukocyte count was 17,000 per cu. mm. with 72 percent neutrophils, 25 percent lymphocytes, 2 percent monocytes, and 1 percent basophils. The erythrocyte count was 5,400,000 per cu. mm. The hemoglobin was 14 gm. The platelet count was 83,000 per cu. mm. The hematocrit was 38 percent. The erythrocyte sedimentation rate and the urinalysis were normal. The standard Kahn test was negative. A blood culture was taken on April 29 and a sample was sent to the Seattle-King County Department of Health Laboratory, together with the history of the rat bite. This laboratory recovered the *Streptobacillus moniliformis* by culture on standard tryptose phosphate broth enriched with 20 percent ascitic fluid. After 5 days of incubation the typical fluffy ball colonies were present in the broth, and smears showed the characteristic pleomorphic organisms with filaments and beads. The organism was inoculated into four mice, all of which died, and the same organisms were recovered from them. The laboratory has been able to maintain the strain on Löffler's medium until this date. No pleuropneumonialike (L_1) organisms were seen.

On April 29 the child was started on 300,000 units of procaine penicillin intramuscularly daily for 4 days. The temperature, which ranged between 102° and 104° F. on the first day, dropped to 101° F. on April 29. The following day the temperature was normal and remained so. After the first day the child slept well and had no complaints. The petechial rash around the mouth faded and the ulcer on the tongue began to heal rapidly.

The child was discharged from the hospital May 2, 1952. Since then he has been well. It was ascertained that the rat had been obtained from a pet shop in Seattle. The family gave the rat responsible for the illness to the Seattle-King County Laboratory where it was autopsied, but no organisms were obtained from the examinations.

REFERENCES

(1) Watkins, C. G.: Ratbite fever. J. Pediat. 28: 429 (1946).

(2) Dolman, C. E., Kerr, D. E., Chang, H., and Shearer, A. R.: Two cases of rat-bite fever due to *Streptobacillus moniliformis*. Canad. J. Pub. Health 42:228 (1951).

Sanitary Quality of Crushed and Cubed Ice As Dispensed to the Consumer

By V. D. FOLTZ, M.S.

INFORMATION on the sanitary quality of ice as it is served in iced drinks and used to chill foods in public eating places apparently is unavailable in the literature. There are references in the literature of the early nineteen hundreds to studies made on "natural" ice harvested in the winter season and stored for summer use, but these reports are conflicting as to the quality of the ice. At that time it was common belief that natural freezing would destroy any disease germs that might have been present in the original water.

At the present time most of the ice used for chilling food and drink for human consumption is commercially frozen. With the introduction of the use of high-quality water in producing ice, it was generally assumed that the ice would be of the same high quality. This assumption was questioned, however, as early as 1905. A study of a typhoid epidemic in the District of Columbia in that year necessitated the examination of both the "natural" and artificial ice sold in the area, and sanitary surveys revealed that the sanitary conditions in commercial ice plants left much to be desired (*1*).

In recent years sanitarians have formulated standards of quality for commercial ice and have introduced regulations covering such items as (*a*) the water supply used, (*b*) the plumbing and toilet facilities of the premises and surrounding area, and (*c*) the employees' health. If such regulations are adhered to, the ice (usually in 300-pound cakes) should be of high sanitary quality when pulled from the freezing tanks. As evidence that the cake ice in the area covered by the studies described in this report is of high quality, the following data are submitted. Ten samples of cake ice, representing at least five ice plants, were purchased, handled with the same aseptic precautions, and cultured in the same manner for coliform, clostridia, and standard plate count as subsequently described for crushed and cubed ice. No coliform or clostridia organisms were detected in any samples, and the average standard plate count for the 10 samples was only 6.8 per 1 ml. of water.

In a previous report attention was called to the gross inert material and high coliform, anaerobic, and total plate count of a limited number of crushed-ice samples (*2*). This paper reports more detailed studies of the sanitary quality of both crushed and cubed ice as it is dispensed to the consumer.

Mr. Foltz, professor and acting head, department of bacteriology, Kansas State College, and bacteriologist in charge, Kansas Agricultural Experiment Station, gave this paper before the American Public Health Association, October 21, 1952, at Cleveland, Ohio.

Test Methods

Standard Methods for the Examination of Water and Sewage (ninth edition) was followed in detail for all procedures relative to plate counts and tests for the presence of members of the coliform group.

The "stormy fermentation" test for the *Clostridium welchii* (*Clostridium perfringens*) group was made by inoculating sterile skim milk in test tubes covered with a paraffin-vase-

line seal, with 5 portions each of 10.0, 1.0, and 0.1 ml. of water, heating the tubes at 80° C. for 15 minutes, immediately chilling, and then incubating them at 35° C. for 5 days. No tube was called positive unless the seal was blown from the tube and the curd gave a typical "stormy" type of appearance.

Isolation of the dominant type of coliform was made from eosin-methylene blue agar plates streaked from the smallest inoculum giving a positive or a doubtful presumptive test. Identification was carried only to the point of determining the methyl red and Voges-Proskauer reactions on each isolate. Further studies on a limited number of samples were made by adding 50.0-ml. quantities of melted ice to 50.0 ml. of double strength selenite F enrichment medium. This mixture was incubated at 35° C. for 24 hours and subcultured onto bismuth sulfite and S S agar. Colonies suspected of being noncoliform enteric types were isolated and subjected to differential study, as outlined in Diagnostic Procedures and Reagents (third edition).

To detect the presence of and to identify micrococci and streptococci, incubation of 5 portions each of 10.0, 1.0, and 0.1 ml. of water in the enrichment medium designed by Ritter and Treece (*3*) for the isolation of cocci from swimming pool water was the first step. When growth appeared, all tubes were subcultured on 5.0 percent sheep blood agar. No tube was regarded as negative until 10 days' incubation at 35° C. revealed no growth.

From the blood agar plates incubated at 35° C. for 48 hours, colonies suspected of being micrococci and streptococci were isolated for further study and identification. Those colonies proving to be streptococci were grouped according to the methods outlined by Sherman (*4*). Micrococci were identified according to Bergey's Manual (sixth edition), and the identification was substantiated with additional tests.

Physical examination of ice samples was limited to the passage of 300 ml. of water through cotton sediment disks with an exposed surface of 0.68 sq. in. A comparison of the amount of sediment collected was made with standard sediment disk photographs, as described in Standard Methods for the Examination of Dairy Products (ninth edition). Sediment identification was made by wide-field binocular microscope examination.

Residual chlorine was determined colorimetrically by the orthotolidine method, using a Hellige comparator.

Field Procedure

Samples of ice were collected from hotels, restaurants, soda fountains, hospitals, and soft-drink parlors in sterile wide-mouthed jars. The filled jars were sealed immediately with a lid lined with sterile cellophane to prevent the possibility of lacquer from the jar lid flaking and confusing the sediment picture. Bagged ice was purchased and aseptically transferred to the same type of container. All samples reached the laboratory only partially melted. They were tempered at 40° C. until the ice melted and then immediately examined.

The ice samples were collected from establishments in central Kansas within an area having a radius of 150 miles. They included 77 samples of crushed ice and 37 samples of ice from automatic ice-cube machines. Ten of the ice-cube samples came from hospitals. It was thought that this latter group of samples would represent the ideal in sanitary machine care and ice-dispensing techniques. Collections of samples were made either in June, July, or August, or in December or January so that a comparison of the sanitary quality of ice during the two climatic extremes could be made.

Numbers of Bacteria

In table 1 are presented the data on the numbers of bacteria found in the 114 samples of ice included in this study. Only 27 (about 23 percent) of the 114 were free from coliform contamination and would be of acceptable quality on the basis of drinking water standards.

The 84 samples collected during June, July, and August contained the highest average MPN (most probable number) of both coliform and anaerobic bacteria and the second highest average standard plate count of the 6 groups of samples. The winter samples had a comparatively low average coliform count, indicating a decidedly better quality of ice than

Table 1. Numbers of bacteria found in 114 samples of crushed and cubed ice

Range of MPN coliform per 100 ml.	Number samples	Average MPN coliform per 100 ml.	Average MPN clostridia per 100 ml.	Average standard plate count per 1.0 ml.
All samples (114):				
0	27	0	1.4	1,330
2–23	24	8	9.5	26,300
24–920	32	235	48.4	5,200
1,600–>1,600	31	>1,600	46.8	58,400
Average	----	506	28.6	23,000
Summer samples (84):				
0	14	0	14	1,770
2–23	14	9	5.9	43,600
24–920	27	219	56.8	5,900
1,600–>1,600	29	>1,600	42.2	51,900
Average	----	624	36.3	27,400
Winter samples (30):				
0	13	0	2.7	852
2–23	10	6	44.1	1,983
24–920	5	322	3.1	1,370
1,600–>1,600	2	>1,600	9.5	152,350
Average	----	162	17	11,415
Commercial crushed ice (77):				
0	10	0	36	1,028
2–23	18	7.4	13	34,997
24–920	23	267	67	6,508
1,600–>1,600	26	>1,600	499	69,266
Average	----	615	32	33,600
Ice-cube machine ice (37):				
0	17	0	.11	1,509
2–23	6	10	.33	212
24–920	9	56	0	1,874
1,600–>1,600	5	>1,600	0	1,795
Average	----	255	.11	1,561
Hospital samples (10):				
0	10	0	0	1,029
2–23	0	0	0	0
24–920	0	0	0	0
1,600–>1,600	0	0	0	0
Average	----	0	0	1,029

the summer samples. However, the coliform count coupled with an average MPN of 17 clostridia per 100 ml. of water and a standard plate count of 11,415 bacteria per 1 ml. indicates a poor quality product on the basis of the standards for acceptable drinking water.

Only 10 (13 percent) of the 77 samples of commercial crushed ice were found to be free of coliform bacteria, whereas 17 (46 percent) of the 37 samples of cubed ice were free of coliform organisms. All 10 of the hospital samples were free of both coliform and clostridia organisms.

Types of Organisms

The dominant coliform types isolated from the 87 samples giving positive and doubtful presumptive tests were *Escherichia coli* from 41 samples and *Aerobacter aerogenes* from 46. In some samples only one type of the coliform group appeared to be present; but in the majority of the samples a mixture was observed.

From the limited number of samples subjected to selenite F enrichment and subsequent streaking on S S and bismuth sulfite agar, a number of isolations were made from entericlike colonies. Examination of these cultures yielded organisms identified as *Proteus* spp. and *Paracolobactrum* spp.

Pseudomonas spp. were found in 25 of the 114 samples studied; *Pseudomonas aeruginosa* was isolated most frequently, followed by *Pseudomonas fragi.*

Thirty-two of the 37 machine ice-cube samples were cultured in sodium azide enrichment broth to make possible the isolation and subsequent identification of micrococci and streptococci. The results are recorded in table 2 in such a manner as to make possible a comparison between growth in azide broth and the isolation of coliform types. The frequency of micrococci and streptococci isolations from coliform-positive and coliform-negative samples is also shown.

Growth developed in sodium azide medium in 24 (75 percent) of the 32 samples cultured in this medium. From these azide-growth-positive samples coliform types were isolated from 16, streptococci from 19, and micrococci from 22. It is significant that coliform types were found in only 1 of the 8 azide-negative samples. Seventeen of the coliform-positive samples were found to contain streptococci and/or micrococci—streptococci in 14 and micrococci in 16. In contrast the 15 coliform-negative samples yielded only 6 streptococci and

Table 2. Number of samples from which isolations of micrococci, streptococci, and coliform organisms were made, and correlation of findings: 32 samples of cubed ice examined

	Azide broth		Coliform isolation	
	Growth	No growth	Positive	Negative
Micrococci isolated	22	------	16	7
Micrococci not isolated	2	------	1	8
Streptococci isolated	19	------	14	6
Streptococci not isolated	5	------	3	9
Coliform present	16	1	17	15
Coliform not present	8	7	------	------
Growth in azide broth	24	------	16	8
No growth in azide broth	-------	8	1	7

7 micrococci isolations. One hundred and eighty-four cultures of micrococci were isolated from the 24 growth-positive-azide samples. A brief study of the micrococci revealed that 97 were hemolytic, and 87 nonhemolytic; 11 (5 percent) were coagulase positive, and 173 coagulase negative; and 63 produced yellow, 14 orange, and 107 white pigment. The organisms were identified as belonging to the following species: *Micrococcus pyogenes* var. *aureus* and var. *albus; Micrococcus citreus; Micrococcus flavus; Micrococcus epidermidis; Micrococcus candidus; Sarcina flava; Sarcina aurantiaca; Sarcina lutea.*

Ninety-eight streptococci cultures were isolated from the 24 azide-positive samples. Of these cultures 87 were found to belong to the enterococcus group, 10 to the lactic group, and 1 to the viridans group. A large percentage of the cultures grouped as enterococci grew at 10° C. and at 45° C. and in the presence of 6.5 percent sodium chloride, indicating that they were probably *Streptococcus fecalis.*

The MPN of micrococci ranged from 2 to more than 1,600 per 100 ml. of water, and the streptococci, from 4.5 to more than 1,600. The micrococci gave higher MPN values than the streptococci.

Sediment

Sediment collected by filtration and examined under the wide-field binocular microscope was found to contain sand, clay, assorted colored fibers, assorted colored threads, vegetable fibers, finger-nail-polish scales, insect fragments, rodent hairs, and wood splinters. The amount of sediment removed by the filtration of 300 ml. of water ranged from 10.5 mg. to 0.25 mg., averaging 2.25 mg. The ice-cube samples contained the least amount of extraneous material, and the group of summer samples contained the largest amount of sediment. Available residual chlorine was consistently low or entirely absent; the largest amount in any sample was 0.01 ppm.

Discussion

The finding of only 13 percent of the crushed-ice samples to be of satisfactory sanitary quality when judged by the standards used for public water supplies indicates that most of the crushed ice in the area covered by this survey is of extremely poor quality. In general, the same conclusion applies to automatically frozen cubed ice dispensed in commercial establishments.

The frequent isolation of *E. coli*, universally accepted in water analysis as an indicator of pollution of human or animal origin, suggested the desirability of testing for other types of organisms of possible sanitary significance. The subsequent tests for clostridia, enteric bacilli, micrococci, and streptococci revealed that one or more of these four groups of bacteria, which are intimately associated with the human body, were found in the majority of ice samples. Frequently the numbers were large enough to suggest recent heavy pollution of possible human origin.

The organisms found are of sanitary significance not only because ice is introduced directly into beverages, but also because it is used in direct contact with foods, some of which are eaten raw, to accomplish chilling. Micrococci, streptococci, coliform types, paracolon organisms (*5*), and *Proteus* (*6*) all have been identified as or suspected of being the causative agent in food poisoning. *Pseudomonas* spp., which were detected in 22 percent of all ice samples examined, are known to play an important role in the spoilage of certain foods (*7*). Thus, crushed ice in direct contact with

food may serve as a source of contamination with both food-spoilage and food-poisoning organisms.

Origin of Microorganisms

The question naturally arises as to the origin of the large numbers of bacteria found in ice when it reaches the consumer. Time has not permitted a thorough investigation of this phase of the problem, but some information is available.

Ice is usually manufactured from a water supply which is tested regularly and maintained at an acceptable sanitary level. Furthermore, cake ice as taken from the freezing tank was found to be entirely satisfactory, whereas crushed ice from the same plant was found to be highly contaminated. Finally, the temperature within a mass of crushed ice and the limited time interval between crushing and consumption would, for practical purposes, eliminate growth of all the organisms tested for in this investigation. Thus, it would seem reasonably certain that most of the microorganisms found in crushed ice when it reaches the consumer have gained entrance at one or more points between the freezer and the consumer.

No effort was made in this study to evaluate the relative significance of factors which may contribute to the contamination of crushed ice. Even a casual examination of the average ice plant and other facilities for handling ice, however, will indicate many possible points of contamination: the ice plant itself; the sawing, crushing, and grinding equipment; the containers in which the ice is transported; the loading and unloading docks; the delivery trucks and insulating blankets; and the dispensing facilities. Factors to be considered are the construction of the ice plant, the maintenance of the equipment, the protection afforded the ice after it leaves the freezing tank, and the practices used in handling the ice.

Although the bacterial content of cake ice was found to be practically nil, the producer is not relieved of all responsibility for the quality of the crushed ice delivered to the consumer. A rapidly expanding practice in the handling of ice is for the producer to deliver crushed ice to the dispenser. The ice may actually be packaged in bags which the retailer dispenses intact. Several samples of bagged crushed ice were included in this study, and no significant difference in quality was noted between this ice and the crushed ice collected from the individual dispensers.

The fact that ice from automatic freezers in hospitals was found to be of high sanitary quality whereas most of that from machines in retail establishments was found to be of poor quality indicates an absence of sanitary precautions in machine care and in dispensing techniques in the latter. The feasibility of producing high-quality ice with the automatic ice-cube machine is demonstrated by the finding of all hospital samples free of coliform and clostridia organisms.

Corrective Measures

Despite the fact that ice is by its very nature one of the products most amenable to sanitary production and handling, the data presented here leaves no question as to the poor sanitary quality of much of the ice dispensed to the consumer in the area covered by this survey. What are the reasons for this apparently paradoxical situation? Primarily, it is due to the absence of factual information concerning the quality of consumer ice; secondarily, to the lack of appreciation, on the part of producers and handlers, of the factors influencing the sanitary quality of ice. It is hoped that the facts presented here will stimulate such additional research as is necessary to evaluate the relative significance of the many factors contributing to the poor quality of crushed and cubed ice. Only with such information will it be possible for public health authorities to formulate adequate regulations concerning production and handling of this product.

In the meantime, any well-trained sanitarian can initiate an educational program in his community, a program which will acquaint the public with the need for a better product and provide the producer and handler with the necessary information to meet a demand for high-quality ice.

Summary

Data are submitted which show that the majority of crushed and cubed ice at the consumer level is of extremely poor sanitary quality.

Evidence is presented indicating that initially ice from both commercial and automatic freezers is of acceptable quality. The high plate counts, the presence of significant numbers of *Escherichia coli*, clostridia, micrococci, and streptococci, and the quantities and types of inanimate material present in crushed and cubed ice suggest recent, heavy contamination, at least a portion of which is of human origin. The implications associated with the extensive consumption of such a product are obvious, and the problem deserves early attention by public health authorities.

REFERENCES

(1) Lumsden, L. L., and Anderson, J. F.: The origin and prevalence of typhoid fever in the District of Columbia (1909–1910). Hygienic Laboratory Bulletin No. 78. Treasury Department, Public Health and Marine-Hospital Service of the United States. Washington, D. C., Government Printing Office, 1911.

(2) Foltz, V. D.: A bacteriological study of water supplies for tourists and work gangs. The Public Health Laboratory. **9:** 50–55 (1951).

(3) Ritter, C., and Treece, E. L.: Sanitary significance of cocci in swimming pools. Am. J. Pub. Health **38:** 1532–1538 (1948).

(4) Sherman, J. M.: The streptococci. Bact. Rev. 1: 3–97 (December 1937).

(5) Barnes, L. A., and Cherry, W. B.: A group of paracolon organisms having apparent pathogenicity. Am. J. Pub. Health **36:** 481–483 (1946).

(6) Cherry, W. B., Lentz, P. L., and Barnes, L. A.: Implication of *Proteus mirabilis* in outbreak of gastro-enteritis. Am. J. Pub. Health **36:** 484–488 (1946).

(7) Tanner, F. W.: Microbiology of foods. Ed. 2. Champaign, Ill., Garrard Press, 1944, 1196 pp.

Public Health Service Staff Announcements

Dr. James R. Shaw has been assigned as chief of the Branch of Health of the Bureau of Indian Affairs where he will supervise the administration of 59 Indian Service hospitals and the public health program of the Bureau. He has been chief of the Division of Hospitals, Public Health Service, the past year. Previously, he was medical officer in charge of the Public Health Service Hospital in Detroit. Dr. Shaw has also held medical staff positions in the Public Health Service Hospital in San Francisco and its clinics in Los Angeles and San Pedro, and has served as district medical officer of the Coast Guard at Long Beach, Calif. He was admitted to the commissioned corps of the Public Health Service in 1939.

Dr. Clifton K. Himmelsbach has been appointed assistant chief of the Division of Hospitals, Public Health Service, as successor to **Dr. Myron D. Miller,** recently assigned medical officer in charge of the Public Health Service Hospital in Seattle. For the past 5 years, Dr. Himmelsbach has been medical officer in charge of the Washington, D. C., Outpatient Clinic of the Public Health Service. He has held medical staff positions in several Public Health Service hospitals, and in the Service's hospital in Lexington, Ky., he directed clinical investigations on narcotic drugs and addiction. Before coming to Washington in 1947 as chief of the medical operations branch of the Federal Employee Health Program, he was a medical consultant for the Office of Vocational Rehabilitation.

Dr. Stanley E. Krumbiegel has been appointed medical officer in charge of the Public Health Service Outpatient Clinic at Washington, D. C., to succeed Dr. Himmelsbach. Dr. Krumbiegel has been medical director of the Bureau of Prisons, Department of Justice, since 1948. Since receiving his commission in the Public Health Service in 1939, he has served as medical staff officer in Public Health Service hospitals in Boston and on Ellis Island, and as staff psychiatrist and chief medical officer in a number of Federal penal and correctional institutions.

State Laws on Financing and Staffing Local Health Departments

By CLIFFORD H. GREVE, M.S.P.H., and KATHRYN J. CONNOR

This report completes a three-part presentation in Public Health Reports of a study of State laws, regulations, and practices applicable to local health departments, made by the Division of State Grants of the Public Health Service.

The first section, entitled "Provisions of State Laws Governing Local Health Departments" (January 1953, pp. 31–42), described existing laws, regulations, and accepted practices with respect to boards of health, health officers, and the organization of local health departments.

The second section is entitled "General Regulatory Powers and Duties of State and Local Health Authorities" (April 1953, pp. 434–438).

A separate 68-page report entitled "State Laws Governing Local Health Departments" (PHS Publication No. 299) presents in tabular form data by individual States on all aspects of the study.

Thus, a comprehensive report of public health legislation is available as reference material to guide States in planning legislative programs in this field.

The data summarized in these reports are from questionnaires prepared by regional office personnel of the Public Health Service assisted by regional attorneys of the Department of Health, Education, and Welfare. Information relating to procedures carried out by practice in the absence of statute or regulation was collected in personal interviews with State health officers or members of their staffs.

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STATES have fewer laws, regulations, and practices pertaining to the financing and staffing of local health departments than they have for governing the appointment and qualifications of local health officers, the establishment of local health units, or the delegation of broad regulatory powers and duties to State and local health authorities.

Distribution of Costs

In all States, local units of government are permitted to raise local revenues to finance all or part of the cost of local health departments. However, specific or general limitations are frequently placed on this general power either by statute, regulation, or by practice without statutory authority. Some of the limitations may be applicable only to some types of local governmental areas or only under certain conditions.

About two-thirds of the States prescribe methods for allocating the cost of operating local health departments among participating local units of government. Such allocation may involve distribution of costs among counties in district health units, or between county and city in city-county units, or among townships in single-county units. Specific methods for the proportionate distribution of costs

Mr. Greve is chief and Mrs. Connor is an analytical statistician of the analysis and reports section of the Division of State Grants, Bureau of State Services, Public Health Service.

Table 1. Number of States providing for local financial support of health units by statute or practice

Type of provision	Total States with provisions		States with provisions generally applicable		States with provisions of limited application [1]	
	Statute	Practice	Statute	Practice	Statute	Practice
Prescribed local percentage of cost [2]	4	6	1	4	3	2
Specific millage limitation on taxation	21	----------	13	----------	8	----------
Special health tax beyond other limitations	23	----------	18	----------	5	----------
Mandatory tax rate or millage	4	----------	2	----------	2	----------
Per capita local appropriation	2	2	2	1	----------	1
Minimum dollar amount	1	3	----------	3	1	----------
Other provisions	26	2	3	1	23	1

[1] Refers to States in which provisions are applicable only to some governmental areas or only under some conditions.

[2] Authorized by regulation in 1 State.

among local governmental units are established by statute in 26 States, but in 6 of these the method of allocation is applicable only to district health units, and in one other State only to cities and districts. In describing the method of apportionment of funds from local resources among local units of government, States most frequently report the use of a population factor.

Local Financing

Several types of provisions are used by the States to determine the share of total local health department costs which are to be met from local revenues. Eleven States require that a prescribed percentage of the cost of operating each local health department be met from local revenues (table 1).

Local financing of health departments is frequently influenced by statutory tax provisions. Local taxation is based primarily upon real estate valuations. Tax limit provisions in 21 States establish by law a specific millage limitation applicable either to specific taxes for public health purposes or to taxes in general. In either case such provisions place a limit upon local revenues available for public health purposes. Twenty-three States have statutes which permit levy of a specific health tax in excess of other tax millage limitations. In only 4 States does the law require the imposition of a mandatory tax rate or millage for the financing of local public health programs.

Four States require a local per capita appropriation as the share to be borne by local revenues. In 4 States a minimum dollar amount is required of local governments in financial support of the local health department.

Twenty-eight States report other provisions that are applicable to the financial support of local health departments. These are generally contained in statutes but are usually limited in their application. Frequently, a State may have more than one provision applicable to the local financing of health departments.

Nineteen State health officers indicated that local health departments should be supported from the general tax fund, while 21 State health officers thought local financial support should come from special tax provisions. At least 7 health officers thought local financial support should come from both sources.

State Financing

Inadequate local revenue from tax resources requires local health units to depend in part upon State funds and other resources for assistance in financing their health programs. Nearly three-fourths of the States have statutes which authorize the distribution of State funds to local health units (table 2).

Methods used to distribute State funds are important in the sharing of State revenue with local units of government. These methods usually fall into two groups: those designed to allocate available funds by some objective method, and those based on subjective judgment. Objective formulas vary widely between

States but, in general, are designed to provide a State-local fiscal relationship which offers security to local health programs. Comments made by State health officers indicate that most of them think it desirable to establish a relationship between local and State funds for allocating the cost of local health units.

One type of objective formula used by one-fourth of the States provides that a percentage of total operating costs of local health units be met from State funds. By a second method of distribution closely related to that of paying a percentage of the total cost, the State pays a percentage of the salaries of all or certain selected employees of local health departments.

Other types of objective formulas are used by 17 States in the distribution of State funds. There was wide variation in the objective methods described, but the use of factors of population and financial need was reported most frequently. Basic grants to each local area, or grants based upon specific health needs, are not uncommon factors employed. As an adjunct to the distribution of State funds, contracts are frequently drawn between State and local officials to legalize the financial agreement made either through the use of subjective judgment or an objective formula.

Payment Procedures

The designation of an official custodian of local health funds is accomplished by law in 33 States, in 8 additional States by common practice, and in 1 State by regulation. Almost universally, the person designated as official custodian of the local health unit funds also disburses the funds. In districts, the treasurer located in the most populous county or in the county housing the headquarters of the local health department is generally the disbursing officer for multicounty units.

The payment of State funds to local health units is made on a reimbursable basis in only 20 States. Six of these States have statutes providing for a reimbursable payment procedure; 13 States do so by practice, and 1 State by regulation.

Actually, the reimbursable principle is frequently achieved by issuing State checks to cover salaries of local health department employees. Thirteen States report that they issue checks against local funds covering salaries of local health department employees, but in only 3 States is this done on the basis of a statutory provision.

Twenty-six States issue State checks to pay the salaries of local health department employees who are paid from State and Federal funds. In conjunction with this procedure, the use of State or Federal funds in local health department budgets is frequently limited to salary items. In 1 State it applies only to the salaries of nurses employed in local health units. In only 13 of the States which pay local employees with State checks does the check indi-

Table 2. Number of States providing for the authorization and distribution of State funds to finance local health units by statute or practice

Type of provision	Total States with provisions		States with provisions generally applicable		States with provisions of limited application [1]	
	Statute	Practice	Statute	Practice	Statute	Practice
Authorization for distribution of State funds [2]	35	4	32	2	3	2
Objective methods for distribution of State funds:						
Percent of total cost [2]	6	5	5	4	1	1
Percent of salaries	3	4	2	4	1	----
Other objective formulas [2]	5	11	5	11	----	----

[1] Refers to States in which provisions are applicable only to some governmental areas or only under some conditions.

[2] Authorized by regulation in 1 State.

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Table 3. Number of States with statutes or practices designating authority for the preparation and approval of local health budgets

Authority [1]	Total States with provisions		States with provisions generally applicable		States with provisions of limited application [2]	
	Statute	Practice	Statute	Practice	Statute	Practice
Budget preparation						
In single governmental areas:						
State health department	2	12	----	9	2	3
Local health officer	5	34	4	29	1	5
Local board of health	11	4	10	2	1	2
In districts:						
State health officer	1	9	1	9	----	----
District health officer	----	14	----	14	----	----
District board of health	13	6	13	2	----	4
Budget approval						
In single governmental areas:						
State health officer [3]	8	20	7	16	1	4
Local board of health [4]	5	17	3	16	2	1
Local legislative body	18	15	15	11	3	4
Local administrative official	3	9	2	4	1	5
In districts:						
State health officer [3]	5	23	5	20	----	3
District board of health [4]	3	12	3	12	----	----
Local legislative body	10	11	8	11	2	----

[1] Budgets are usually prepared and approved by more than one authority.
[2] Refers to States in which provisions are applicable only to some governmental areas or only under some conditions.
[3] Authorized by regulation in 2 States.
[4] Authorized by regulation in 1 State.

cate the source of funds from which the employee is being paid.

Ten States require that local funds for the support of local health units be deposited in State treasuries for disbursement. Three States require local funds to be deposited locally for disbursement by a State health department official or other State disbursing officer.

State funds are paid to local custodians of funds for disbursement in 21 States. Only 8 States have statutes establishing this procedure, and in 1 State new enabling legislation sets up the procedure. The payment of State funds to local custodians is specifically prohibited by law in 2 States.

Budgets and Plans

The responsibility for the preparation of local health department budgets is delegated to a wide variety of officials, and such delegation is more frequently based on practice than on statutory provision. In 14 States, local health department budgets for single governmental units such as cities or counties are prepared by the State health department. Local health officers serving this type of unit have some responsibility for the preparation of budgets in 39 States (table 3).

In 10 States district health department budgets are prepared by the State health officers although only 1 State has statutory provisions prescribing this procedure. District health officers prepare their budgets in 14 States, while district boards of health prepare the budgets in 19 States.

After budgets of local health departments have been prepared, there is usually some procedure established for their approval. Provisions for budgetary approval are more frequently established by practice than by statute and may involve more than a single official or agency. The State health officer is responsible for approving local health department budgets in 30 States, and he also has authority in 30

States to approve district health department budgets.

As indicated in table 3, the local board of health is responsible for approving budgets for single governmental units in about half the States. In 33 States the local legislative body has some responsibility for approving budgets. Local administrative officials have responsibility for the approval of budgets in 12 States.

In district health units the budgets are usually approved by the State health officer, but district boards of health have powers of budget approval in 15 States. Local legislative bodies in districts may approve budgets in 21 States.

Almost universally, State health officers commented that local health officers should prepare the budgets with some other local or State authority, or both, having power of approval.

A relatively new procedure of plan preparation requires local authorities to outline their health programs in advance. Less than half of the States have provisions for the preparation of plans either through statutory requirements or in practice. Seventeen States indicated that plans for single governmental health units are prepared in practice.

Twelve States require plans from district health units in practice, while 5 other States have statutory requirements with respect to plans for these units.

The majority of States which require plans from local health units also require that more than one authority approve each plan, and this approval is usually based on practice rather than on regulation or statute. The State health officer is the authority most frequently assigned this responsibility, but in only about a third of the States requiring his approval is it based upon statute.

Staffing Local Health Departments

Staff appointments in local health units usually are made by the local health officer or the local board of health. Frequently, there is joint approval by the local health officer and local board of health in making such appointments. The law in some States requires that certain officials, such as the city and county commissioners, or the State health department be consulted with respect to staff appointments. Thirty-seven States have provisions permitting the local health officer to make staff assignments to local units (table 4). In 20 States the local board of health has statutory appointing authority, but in a dozen States these boards are not the sole possessors of this authority. In 4 States the law limits the appointing authority of local boards of health to city health departments. The questionnaires

Table 4. Number of States providing for staff appointments to local and district health units by statute or practice, according to appointing authority

Personnel appointed by	Total States with provisions		States with provisions generally applicable		States with provisions of limited application [1]	
	Statute	Practice	Statute	Practice	Statute	Practice
In single governmental areas:						
Local health officer	19	18	5	13	14	5
Local board of health	20	6	12	3	8	3
State health department [2]	2	5	1	3	1	2
Local governmental personnel office	2	1	1	----	1	1
Others	11	2	8	2	3	----
In districts:						
District health officer	20	8	12	7	8	1
District board of health	14	1	7	----	7	1
State health department [3]	1	5	1	3	----	2
Each constituent unit	3	----	2	----	1	----
Others	1	1	1	1	----	----

[1] Refers to States in which provisions are applicable only to some governmental areas or only under some conditions.
[2] Authorized by regulation in 3 States.
[3] Authorized by regulation in 2 States.

further reveal that 10 State health departments make staff appointments to local health units.

Predominantly, the responsibility for staff appointments to district health units rests with the district health officer, and in 20 States he has such authority by statute (table 4). The data also indicate that statutes in 14 States provide district boards of health with the responsibility for making staff appointments, but in only 6 States do they perform this duty alone. The State health department appoints personnel to district health units in 8 States. Statutes in 3 States require that appointments to multicounty health units be made by each constituent unit making up a district health department.

In 17 States personnel in district health units serve only the constituent governmental unit to which they are assigned rather than serve throughout the district. This is a statutory requirement in 5 States. Personnel serving in district health units are responsible to the district health officer in 37 States.

Merit System

Personnel of local health departments in the majority of States are employed under some type of merit system. One-third of the States have statutory provisions for a merit system covering local health department employees. Regulations for the establishment of a merit system for local health department personnel exist in 7 States; however, in 2 of these States statutory provisions for this purpose also have been enacted. Several States indicate that a merit system is operated for local areas only if they receive State aid.

In the questionnaires States were requested to specify the type of merit system applicable to their local health department employees. A total of 31 States indicated that the State merit system was extended to cover local employees. In 14 States this was accomplished by statute. In 10 States such a procedure was carried out in practice and in 7 States by regulation. Four States administer a separate merit system for local health unit employees, but these are operated either on the basis of practice or by regulation.

Seven States have statutes providing for a locally administered merit system, but in 6 of these States such provisions are limited in their application. Nine States provide for locally administered merit systems by practice with more than half of these having limited application. In one State regulations provide for a locally administered merit system of limited application.

There are 11 States in which local health department employees are, either by practice or by regulation, State employees and therefore employed under the merit system applicable to State employees.

Compensation Plans and Retirement Systems

More than two-thirds of the States have statutory provisions for a statewide compensation plan applicable to local health department employees. In addition, all except one of the remaining States have compensation plans established by regulation or by practice. It should be pointed out, however, that only 5 States indicated that the statewide compensation plan provided for differences in various sections of the State.

There is wide variation between States in the authority named to establish compensation plans. By statutory provision in 22 States the local boards of health establish such plans. A few States name the local health officer, the State health officer, or the State board of health as the establishing authority although few reported this as a statutory provision. In one-third of the States the law requires some other authority, such as the State personnel board or city or county commissioners, to establish the compensation plan.

Placing of local health unit employees under a retirement system is authorized by law in 33 States. Not all local health unit personnel in the same States are covered by the same retirement system. The laws in many States provide for an extension of State retirement plans or the purchase of social security benefits, or both. Local health employees infrequently come under a locally administered retirement plan.

Summary

Local governments in all States are permitted to raise revenue from local resources for the

support of local public health services, but insufficient local revenue necessitates the allocation of State funds to carry on local public health programs. In this connection, States frequently distribute their funds by some subjective formula rather than according to an objective formula. This report shows that requirements for financing local health units are most frequently carried out by statutory provisions. On the other hand, the establishment of payment procedures and planning activities, such as the preparation and approval of local health unit plans and budgets, is usually done by accepted practice.

Payment procedures usually provide for the designation of an official custodian of local health funds, and he is usually the person who distributes the money. Although State funds are often paid on a reimbursable basis, few States follow this procedure by law. More than half the States permit the issuance of State checks to pay local employees.

Statutory provisions generally govern the appointments of personnel to local health unit staffs. These appointments are usually made by one or more authorities but are frequently the responsibility of the local or district health officer and the local or district board of health. The State health departments seldom have the responsibility for assigning local personnel. It is the law in several States that the county or city commissioners, the board of supervisors, or the governing legislative body make local staff appointments.

Although the majority of States report that local health unit personnel are covered by some type of merit system, this coverage rarely is based on statute. Statewide compensation plans, which have been adopted in all but one State, usually are established by local boards of health according to law. The law in two-thirds of the States requires that local health unit employees be placed under a retirement system. Essentially the same number of States report the extension of State retirement plans as report the purchase of social security benefits for local health employees. A few States report the existence of both systems, while some States provide for a locally administered retirement plan.

A Date Book Invitation

RHODE ISLAND. A regular attendance of 75 was attracted to a 1952–53 series of nurses' conferences in Providence by an effective date book device. Since 1950, the bureau of public health nursing in the State health department has worked to develop ways of getting the public health aspects of nursing included in the basic nursing curriculum. The date book was another step in this direction.

The booklet was prepared by the bureau, and the series was sponsored by the bureau and by the State nursing league. Meetings were free and were held monthly in Providence hospitals.

The booklet was sent to social workers, faculty members of schools of nursing, and others who teach basic nursing students. Titled "We Need Rhode Island's Social and Health Agencies—And They Need Us," it announced that the conferences were designed to acquaint members with the health and social resources available in Providence. For each meeting, the subject, the time, and the place were listed on a separate page. Small (about 6¼" by 4¼"), inexpensive (mimeographed), the date book also contained title and introduction pages.

Speakers represented such agencies as the State cancer and heart societies, the Providence police, school, and social welfare departments, and the University of Rhode Island. Typical subjects included discussions on community resources for treating drug, alcohol, and mental health problems; on the availability of child welfare services and rehabilitation for the handicapped; on industrial participation in maintaining community health; and on the success achieved by interagency cooperation.

Unfinished Business and New Forces In Environmental Health Orthodoxy

By ABEL WOLMAN, Dr.Eng.

ON EXAMINING the table of contents of a forthcoming volume on public health under the editorship of one of the most distinguished workers in that field, I was astonished to find no mention of environmental sanitation or hygiene. The volume comprehensively covers elements in the public health field which are largely medical, dealing with the newer fields such as hospital care and geriatrics. But the book ignores the environment.

This field has been well defined by Winslow as "environmental therapeusis," the term encompassing those controls of the environment and that machinery of the community which go into the preservation of health and the prevention of disease.

Perhaps it might be useful to probe a bit into some of our current assumptions and practices in light of Winslow's farsighted concept. Also, we might attempt a glance forward.

Orthodox Functions

Begin with a look at what current engineering literature describes as the "orthodox functions" of the sanitary engineer. I want to take issue with this term and to explain why.

Dr. Wolman is professor of sanitary engineering at the Johns Hopkins University. Awarded the Sedgwick Memorial Medal "for distinguished service in public health" in 1948 by the American Public Health Association, of which he was president in 1939, his professional experience has spanned nearly a half-century and his assignments and interests have taken him into a wide variety of fields.

The orthodox functions are so familiar that nobody in a country such as this worries about water supply so long as something that is reasonably liquid and reasonably clear flows out of the spigot. We have become accustomed over a quarter of a century to a status in which that is the expected.

The canvass of the functions of the State, municipal, and county health departments made by the American Public Health Association recently bears out the fact that the so-called orthodox functions—such as water supply, sewerage, refuse disposal, and food sanitation—take a declining portion of sanitary engineering staff time in those agencies.

Yet travel about the country reveals that although those problems are by definition orthodox, they are, in addition, unsolved. They are unsolved technically and unsolved from the more important standpoint of coverage of the population. Many millions of persons living in well-defined communities in this country—the sparsely populated areas not included—have neither a public water supply nor public sewerage facilities. We are confronted with a persisting problem which has been accepted as solved partly because typhoid fever, the earlier measure of the problem, is disappearing.

In appearing yearly before the Maryland Legislature, in my early days, I defended the State health department budget exclusively and simply on the typhoid fever death rate decline. The familiar curve of typhoid fever disappearance was impressive, quantitative, logical, and simple. It was a much happier day than now

Before the regular monthly general staff meeting of the Public Health Service in Washington on May 1, 1953, an internationally known teacher and practitioner of sanitary science informally examined that field of public health endeavor which Dr. Winslow has characterized as "environmental therapeusis." In the following condensation of Dr. Wolman's informal remarks he notes that while many of our currently underemphasized problems are "by definition orthodox, they are in addition, unsolved." In closing, Dr. Wolman remarked that he knew he was speaking dogmatically and that he had "purposely chosen areas of criticism, simply on the assumption that you know what you have done."

when less dramatic and more subtle complexes must be explained in support of a budget.

Typhoid days are gone, and now people ask: "Why should you concern yourself with the extension of water supply? The typhoid fever rate total is quite small throughout most parts of the United States."

The combination of that disappearing index of necessity (or accomplishment) and the fact that we are dealing with orthodox and familiar principles has resulted in an important technologic and administrative gap in the matter of water supply and sewage and refuse disposal.

Progress in Sewage Disposal?

It required nearly a third of a century to eliminate cesspools and septic tanks in a large part of the congested areas of the United States. Today, we find that accomplishment has become negative. In the last 12 years we have put in more septic tanks and cesspools than we took out in the previous 40. We describe that situation as one which "crept up" on us.

Most health officers and sanitary engineers can recall the struggles to eliminate those early devices from the metropolitan areas. Recently a report came from one State of the installation of thousands of septic tanks and derivatives thereof in the past 5 years—perhaps half of them in areas in which the ground water is 8 inches or so below the surface.

The careful distribution of sewage among the population in certain congested areas has been eminently successful! We could not have done it better by design.

Community Management Problems

All of us in public health and public administration have fallen down in two areas of effort. We have failed to develop the administrative and fiscal machinery necessary to provide the public amenities of water supply, sewerage, and sewage disposal in areas outside the political boundaries of individual cities. Efficient planning, with very few exceptions, declines as one moves out of the municipality itself into its metropolitan areas, and in turn from the metropolitan areas into the more rural counties. It virtually disappears on an intercounty basis. Here we encounter the absence of either or both a responsible official agent or a militant public interest and knowledge. The two, of course, are inseparable, whether in city, metropolitan area, or county.

In the city, the problem is lifting the sights: first, of municipal officials, a task made more difficult because of historical limits; and second, of individuals, who do not see that city plans and ordinances do not necessarily whittle away their private rights.

As in epidemics, government takes action when the hazard to the many becomes too great. It has been about 18 years since the zoning ordinance of Baltimore was upheld by our court of appeals on the basis that smoke and carbon dioxide and congestion were true public health hazards. Within the city, however, there is still insufficient integration of planning and programs by the department of public works, the department of health, the department of highways, the city planning commission, the housing

authorities, and the redevelopment commissions. And I know of no city which has been able to accomplish this integration satisfactorily.

Metropolitan and Rural Areas

In the metropolitan area and counties, we are confronted with the problem of ex parte units. As chairman of the Maryland State Planning Commission for 10 years, I called officials together from the various areas frequently but found that a political boundary line on a map is an amazing brick wall.

We are edging into progress in the direction that all would like to see. In many instances, the State sanitary engineer has the opportunity to effect cooperation because he gets around. He has a comprehensive view. His facilities in general transcend political boundaries. He has a potential—one which he has not always used because he is busy with other things and gives integration and cooperative planning a low priority.

Integration ought to have a high priority. Possibly no one would require a sanitary engineer to be also a city planner, but he could be one of the best and sometimes is.

Suburbia Needs Sewers

The tremendous growth in this country in the past decade will probably continue in the next decade, particularly in the metropolitan areas, and generally there is no organization to assure installation of conventional sanitation features. All down the line our official groups for one reason or another have failed to introduce or develop the planning that would have prevented retrogression in this area.

In some of our States, sanitary district operations are almost at a minimum. Even in one of our greatest metropolitan areas in 1950, there were 50,000 septic tanks and cesspools within the city limits. Most were brand new. Most were bad. Many were recently installed in unsuitable soils. They were the result of a city policy which decreed that sanitary sewers would not be constructed unless storm sewers were first installed. It drove those areas into a medieval system of sewage disposal. I fail to see any logic in this.

The absence of workable administrative and planning machinery in and around our cities is one charge against our past practice and one which I hope will stimulate thought and future action.

Fiscal Blind Spots

Medical officers and sanitary engineers in their fields of application have a benign disregard for how the money is found. Their objective is to get the orthodox facilities introduced.

It is astonishing to find in no few instances that, when the pressure for installation of a system begins to mount, there is no realization of the amount of money involved. There appears, sometimes, what seems almost a cavalier disregard of whether the system costs $10, $20, or $30 million.

I do not take exception to that too strongly, because if systems are needed and there are sound public health justifications for them, the money should be found. However, increasing attention should be paid to devices for finding such money—and there are devices.

Research in, and transmission of, information concerning methods of finances are as desirable and necessary as is the purely technologic delineation of the system.

Housing: Gap in the Orthodox

Administration sometimes has taken an easy route which reminds me of King Canute. Since sanitary facilities are not easily available, since the administrative machinery is not easily developed, and since the money does not seem to be in sight, the order goes out that no further construction of housing can take place in a particular area.

We must find some alternative to that negativism.

One of our most distinguished sanitary district engineers has announced that the function of his particular agency is to see to it that houses in subdivisions of 500, 1,000, or more shall not be placed where the agency considers them to be inappropriate on a zoning basis. The agency has no zoning powers, but it can extend water and sewer lines. It simply says, "Out in this

area, we do not think you belong. Therefore, you cannot get our facilities." The courts have yet to speak.

Technologic Challenges

An important technologic challenge confronts us in the orthodox areas. It is reflected partly in what I have said about money.

We are using, in the fields of water supply, sewage and refuse disposal, and in housing, approximately the same structural devices, the same technologic procedures that were employed a half century ago. We have made adjustments, of course. We have a different filter bottom than the one used in 1829 in London. It is not materially different, but it is a little different. We use a type of rake, with very modest modifications, which was used in 1913.

Is the state of our art so far advanced that there can be no contributions, not only to reducing cost, but—even to a considerable extent—to modifying and improving the processes?

If you look through our sanitation and engineering rules and our designs, you find that we are the victims of uniformity. Uniformity has great administrative advantages, but it also has great administrative danger, particularly if it curbs investigation, inquiry, and critical diagnosis.

Now let's discuss the future—not 1980, but the future of tomorrow morning. There are a few happenings which have encroached upon the environmental control area and to which we are not giving—in research, administration, or finance—the attention we should.

The Chemical Environment

The first of these happenings is the tremendous advance in the chemical industry. This area of unparalleled expansion is of interest not only because it has increased tenfold in the past 25 years, but also because it deals in a field in which neither the producer, the user, nor the engineer has detailed, accurate knowledge of what is being produced in the way of wastes. It is a strange situation.

Our chemical problems of 25 years ago had elementary simplicity compared with those found in the Kanawha River or the other branches of the Ohio, and even in such streams as the Columbia. The kind of scientific information we need is lacking. We do not even have the instrumentation for identification or measurement.

There is also a tremendous technologic challenge in determining the peripheral effects on those who use this increasingly massive chemical production.

What is the effect of the great array of materials that are placed on the market and sold through radio, television, and newspaper advertisements? What are the products that everybody uses? What is in them? What effects do they have on people? How do we know? Are those effects subtle? Are they long term? Have we any measures for them?

Ionizing Radiation

A second happening is in the field of radiation. About 6 years ago the field was challenging, but it seemed circumscribed, geographically, in total production and in numbers of facilities. Only a handful of locations and installations had been developed, though it is true that they were big, as we thought of them then.

On a map of the production facilities in the field of nuclear fission today, there is hardly a spot in the United States which has not been used for developmental purposes. An additional characteristic of the nuclear energy industry is that, unlike most others, it has gone into areas which normally we would have said would always be isolated.

Radiation is a subject which many if not most health officers and sanitary engineers have avoided. Partly this avoidance is due to the mystery of the scientific practices, partly to the mystery of the terms, and obviously to the mystery of the effects.

This is another area of environmental problems that puts us back in the period between 1800 and 1880 in this respect: We attempt to control a situation without the guidance of the microbiologist. The heavy chemical industry and the radiation industry lack microbiological and physiological criteria. Even when we can determine the extent of contamination, we cannot predict with certainty the physiological effects. The situation is reminiscent of the days

when we began to filter water without knowing why we filtered it, except that people did not like what they were getting. Today, people do not even know what they are getting or where it is coming from.

There must be in the local, State, and Federal agencies that degree of imagination and foresight that would bring more satisfactory indexes for measurement and control. The engineers are not too patiently sitting around waiting for the answers which have come from bench and field investigations, with epidemiological findings as primary guides.

The Virus Diseases

Recently, one of the distinguished workers in the field of poliomyelitis chatted about its impact upon our public health problems and controls. He said: "There may come the day—and it may not be very far ahead—when we will have in this country one of the largest poliomyelitis epidemics of a waterborne nature that the world has ever seen. Everything that I know and have done and have found in our laboratories and in the laboratories of others about its probable epidemiology leads me to the feeling that if our guard is down, and down for even a very short interval of time, with our present sensitive population which we did not have a quarter of a century ago, we will get a disaster."

Another investigator commented with respect to infectious hepatitis: "I don't know what the route of this particular virus will be in its impact on the American population. I do know this: It will be one that should be protected by environmental sanitation. Of that I have little doubt."

Most observers are convinced that part of the control of these viruses is an environmental sanitation problem. It is a problem of food and water. It is curious to have these viruses come into the environmental sphere of interest because they are, strangely enough, in water, the field of our orthodoxy. And we have taken our sights off the field of water supply.

We shall be pushed into a revived interest in water control—and I dislike to admit that the only thing that will push us back into that emphasis in every health department is a calamity. If you look over public health history, and particularly environmental sanitation history, there are periodic reminders, by epidemic, of where we fail.

When we thought we had done everything we could do with the control of milk, we had the Montreal epidemic. A modest mistake, an interesting shift in a valve, and there were 4,000 cases of typhoid fever. On the European scene, particularly in the German area, large numbers of typhoid fever cases of a waterborne origin are occurring in populations which apparently for many years had believed that the water controls were supreme, accurate, and, therefore, could be forgotten.

Again we must turn to research. Quite recently a laboratory technique—cultivation of the Brunhilde virus in the brain of mice—has been developed which may make virus studies many times more practicable than they were in 1952. We seem to be mastering identification and growth of the virus on a simpler, cheaper, and more rapid basis. We may have to wait awhile longer. But now that the technique is available, we ought to sail into detailed developmental studies.

What do our orthodox water and sewage treatments do to the viruses? How do they behave? A year ago such exploration would have taken the whole Federal environmental research budget. Chimpanzees alone would have required a large part, but there is indication that with tissue cultures and mice the answers can be searched for with greater skill, economy, and speed.

Other Environmental Problems

In this country we thought we were rid of the insect and rodent vectors until the 1952 reminder—the human encephalitis outbreak in the Central Valley of California and one of the largest in recent history.

An engineer has to look 30, 40, or 50 years hence in most of his developments, so that I risk the prophesy that we will have repetitions of insect- and rodent-vectored diseases in this country.

Morbidity and mortality statistics reflect conditions which challenge the engineer. I look at the poliomyelitis record, dramatic as it is; I

look at the typhoid record, low as it is; I look even at the respiratory diseases, the sclerotic diseases, and so on, and I find the accident total rate outstrips them all.

Home, highway, and industrial accidents are a leading challenge to public health engineers. And our health departments, not by fiat, not even by conscious agreement, 30 years ago seemed to have ruled accident prevention out of their obligation. I am glad to see that there are evidences that they are going to rule it in again. Why is it all right to kill a child in the house by a defect in structural arrangement or to kill the child on the public street by an engine, but it is not all right to kill it by a virus?

The latter challenge we have accepted in full. About the former, we still have some hesitation. I predict we will have to take it; the public demands we should.

Water for Washing

In Korea last year, a medical investigator of epidemic hemorrhagic fever said to me: "You know, from the standpoint of environmental sanitation, I would say one of our biggest deficiencies up here, and maybe one that would have reduced our mortality and sickness tremendously, is not what you people are always talking about in the sanitary field, namely, the quality of water. The thing that impresses me most is importance of the minimum quantity of water—quantity per se—which insures the capacity to be clean. One of the great demonstrations to me on the front, with all of our diseases, is that quantity of water as a disease deterrent has been ignored."

This is an interesting point of view which I confess I have never thought of before because we live with an abundance of water—not for drinking only, but for all of its multiple sanitary uses. When you get into periods or areas of shortage and stress, the mere ability to wash has a tremendous public health significance.

"I don't even care," this same investigator said, "If they wash in a polluted stream—if only they can wash."

Physiological Engineering

Much of what I have described awaits developments in collateral fields. I now wish to note an engineering field which is subtle and remote.

As we become better acquainted with the physiologist, he says: "Why is it that the engineer stays away from the piping system of the human being? Why does he feel that all hydraulics are restricted to cast iron pipe? Why doesn't he interest himself in the mechanisms of viscosity, of deposition, of corrosion, and the like in arteries?"

The physiologist asks for participation. He says: "Why don't you interest yourself in the filtration system of the kidney? We read your material on filtration through sand. We have a system of capillary filtration which outstrips almost anything you know. We would like some light on hydraulics. Why do you deal with pumps if they are made of metal, but you don't interest yourself in the umbilical cord, which is one of the finest and most interesting and baffling pumps that we know of?"

This is jumping, maybe, into 1955 or 1960, but we should be whetting the interest of promising young engineers in the field of physiological mechanisms.

The Public Health Laboratory

—Yesterday, Today, and Tomorrow—

By ALBERT V. HARDY, M.D., Dr.P.H.

THE SUBJECT upon which I have been asked to speak is timely for me since this is the 50th anniversary of the opening of Florida's public health laboratory. At such a time one is stimulated to look to the past, is at liberty to critically examine the present, and may be at ease in suggesting desirable or possible trends for the future. The history, present activities, and outlook of the various State public health laboratories, though differing in some aspects, still have many features in common. Due to my familiarity with it, Florida's experience will be used as illustrative of the past and present and as a point of departure in considering the future.

The nature of the work of Florida's public health laboratory as it has developed in the past five decades is shown in broad outline in table 1. The rapidity of growth is striking. From 996 specimens in 1903, there was an increase to 15,949 in 1910. The requests for service quadrupled in the next decade, trebled in the twenties and in the thirties, and doubled in the forties. At first the laboratory must have been used almost exclusively to aid in the diagnosis of clinical cases, since prior to 1910 from one-quarter to more than one-half of the specimens were positive in the test requested. At present there is an active concern with the detection of carriers and with case finding, and many specimens sent in for examination come from healthy individuals. Even with exacting techniques the current proportion of positive findings is low. Having grown in an era of development and change, the public health laboratory manifests these characteristics of the age.

Dr. Hardy has been the director of laboratories, Florida State Board of Health, since 1946. *His review of public health laboratory services was presented to the laboratory section of the Southern Branch of the American Public Health Association at its annual meeting in Atlanta, April 23, 1953. It was one of a series of papers arranged by the chairmen of the respective sections, each dealing with one phase of the general subject "Public Health, Yesterday, Today, and Tomorrow."*

The Change in Emphasis

The laboratory experience with malaria, diphtheria, and typhoid in Florida is shown first in table 1 by the number of specimens examined and then is further related to available morbidity and mortality data in table 2.

At the beginning of the twenties, when there were 1,865 reported malaria cases and 352 deaths due to malaria, there were 6,537 examinations for this disease in the Florida State public health laboratories. This was an average of 4 examinations per reported case and 19 per reported death. Malaria declined in the years following, but the number of laboratory examinations increased, reaching its peak in the early forties. In the latter half of the past decade, the incidence of malaria fell rapidly while the number of requests for laboratory tests for the disease decreased slowly. In 1950, there were 351 laboratory examinations per reported case of malaria and 614 per reported death. It was then necessary to call to the attention of physicians the rarity of positive findings for malaria and to urge a

Table 1. Number of specimens submitted for examination to the laboratories of the Florida State Board of Health, and percentage found positive, by year

Examination	1910		1921 [1]		1930		1940		1950	
	Number	Percent positive	Number	Percent positive	Number	Percent positive	Number	Percent positive	Number	Percent positive
Malaria	2, 379	26. 3	6, 537	3. 9	11, 614	6. 3	20, 758	2. 1	2, 456	0. 2
Diphtheria	716	27. 4	13, 688	13. 1	14, 916	4. 9	19, 570	2. 3	4, 439	2. 3
Typhoid [2]	1, 958	27. 7	4, 679	10. 8	7, 226	2. 1	10, 318	2. 5	10, 036	. 7
Tuberculosis	1, 515	25. 4	3, 880	17. 7	4, 239	14. 9	11, 658	11. 3	31, 038	13. 3
Syphilis [3]	0	-------	17, 459	34. 2	64, 377	16. 8	346, 638	17. 8	627, 092	16. 3
Gonorrhea [4]	605	42. 2	3, 180	31. 2	9, 363	21. 4	35, 087	12. 8	52, 836	12. 2
Hookworm	7, 408	56. 0	8, 956	38. 4	38, 342	28. 0	97, 936	28. 8	130, 447	18. 6
Rabies	53	54. 7	218	45. 0	233	29. 6	303	22. 1	513	14. 2
Culture diagnosis:										
Enteric	0	-------	0	-------	0	-------	3, 016	[5] 3. 0	30, 810	[5] . 2
Gonorrhea	0	-------	0	-------	0	-------	79	22. 8	31, 062	5. 3
Miscellaneous	0	-------	0	-------	0	-------	0	-------	[6] 5, 378	-------
Veterinary public health	0	-------	0	-------	0	-------	0	-------	767	-------
Water	51	-------	2, 296	-------	6, 200	-------	10, 003	-------	47, 554	-------
Milk	80	-------	133	-------	(7)	-------	6, 027	-------	19, 704	-------
Chemistry	0	-------	0	-------	0	-------	84	-------	68, 391	-------
Research	0	-------	0	-------	0	-------	0	-------	8, 489	-------
Other	[8] 1, 184	-------	5, 778	-------	20, 069	-------	0	-------	[9] 14, 708	-------
Totals	15, 949	-------	66, 804	-------	176, 579	-------	[10] 561, 447	-------	1, 085, 720	-------
State population	753,000	-------	993,000	-------	1, 480, 000	-------	1, 915, 000	-------	2, 797, 000	-------

[1] Data for 1920 not available. [2] Widal. [3] Serology. [4] Smears. [5] Positive for *Salmonella typhosa*. [6] New activity. [7] Data not available. [8] Predominantly clinical laboratory examinations. [9] Rh tests entirely. [10] In part an estimate based on the number of examinations reported.

discontinuation of a relatively routine submission of specimens for malaria examination in undiagnosed febrile illnesses.

When malaria was common, an erroneous positive finding would have had minor public health and little clinical significance. Now, one of our problems in malaria is the occasional apparently unfounded positive report offered by clinical laboratories. In earlier years, it was acceptable for competent technicians in the clinical or public health laboratory to examine malaria slides. Now, accuracy of the highest degree must be attained, and this requires the participation of qualified parasitologists.

There has been a similar experience with diphtheria. The laboratory activity in this disease increased from 4 examinations per case and 55 per death in 1910 to a peak of 88 examinations per case and 725 per death in 1940. Thereafter the requests for examination fell more rapidly than the incidence of the disease. The individual test is better at present so fewer examinations may be adequate, but perhaps there is undue complacency and insufficient activity. The volume of work in typhoid increased even more markedly (tables 1 and 2). Thus the trend in laboratory examinations in these three communicable diseases has been an increasing number of specimens with a decreasing proportion of positive findings. As the incidence of the infections fell to low levels there was a slow decline in examinations requested, a large number of examinations per reported case or death, and a much lower proportion of positive findings, but each laboratory test and particularly each positive finding now has increasing significance, and reliability of the highest order is required.

Better Diagnostic Tests

By comparison, consider Florida's present position in examinations for tuberculosis and

syphilis (table 1). The laboratory is still in the phase of trying to provide adequate diagnostic and case-finding services. The percentage of positive findings remains high.

The objective in tuberculosis is to detect the infection prior to the onset of clinical symptoms. The mass X-ray surveys and routine radiological examinations of all patients admitted to some hospitals point to individuals warranting study, but it is the responsibility of the laboratory to ascertain whether the suspicious radiological shadow is caused by *Mycobacterium tuberculosis*. Much more sensitive bacteriological tests than those available in the past or at present are needed, and the best available present procedures must be applied by highly qualified workers. Laboratory work in tuberculosis is at its beginning, not nearing its end.

In syphilis, the laboratory has even broader responsibilities since it must provide both the screening and the diagnostic tests. Considering their nonspecific nature, the standard serologic procedures have proved surprisingly effective. These simple examinations undoubtedly still need to be used freely in Florida. Standard serologic tests for syphilis are satisfactory as screening tests, but they have serious limitations as diagnostic laboratory examinations. A more highly specific test is needed. The *Treponema pallidum* immobilization test probably represents an early step to this end. If an obvious need is to be met, State laboratories in the future must make available both a simple screening test and a more highly specific diagnostic test for syphilis. The latter will be more costly, will increase the volume of work, and will require unusually competent professional workers, but it is one of the many challenging tasks ahead.

There is no basis for pride in the record of attainments in the laboratory diagnosis of gonorrhea. Treatment for gonorrhea is simple at present. The laboratory procedures, however, are difficult and their reliability is uncertain. For these reasons there has been a tendency to omit diagnostic laboratory tests, and serious consequences are evident. Nonspecific urethritis is being diagnosed in epidemic proportions, but such a diagnosis signifies only that the case was not proved to be a neisserian infection. Here is a bacteriological problem. Gonorrhea and similar conditions appear to need more, not less, attention.

There will be no disagreement in public health history as to the past prevalence and significance of parasitic infections in the Southern States. Hookworm disease in the early part of the 20th century was a serious cause of morbidity. Many parasitological examinations have been done in the past and in Florida this work continues to increase. There will be differences of opinion as to the present importance of this activity. Optimum health, not the mere absence of obvious illness, is the objective of public health and obstacles to the attainment of this goal must be removed. The individual has a right to be free of parasites. This may be attained by sanitation, a slow but a permanent solution. The rapid and still needed approach is through laboratory diagnosis and treatment. There is unfinished business here.

Table 2. Number of reported cases and deaths from malaria, diphtheria, and typhoid in Florida, and number of laboratory examinations per reported case and death, by year

Year	Reported cases			Examinations per case			Reported deaths			Examinations per death		
	Malaria	Diphtheria	Typhoid [1]	Malaria	Diphtheria	Typhoid [1]	Malaria	Diphtheria	Typhoid [1]	Malaria	Diphtheria	Typhoid [1]
1910	(2)	182	(2)	(2)	4	(2)	(2)	13	(2)	(2)	55	(2)
1920–21 [3]	1,865	576	525	4	24	9	352	78	140	19	175	33
1930	576	491	141	20	30	51	332	79	72	35	188	100
1940	140	223	109	148	88	95	102	27	23	203	725	449
1950	7	97	30	351	46	334	4	8	1	614	555	10,036

[1] Widal. [2] No data on reported cases and deaths. [3] Cases and deaths for 1920; laboratory examinations for 1921.

Culture Diagnosis

Except in diphtheria the relative newness of bacteriological culture diagnosis, as is evident in table 1, is surprising. Enteric and gonorrhea cultures have been used chiefly in the past decade; those for tuberculosis, in the past half decade. Miscellaneous bacteriological service is a recent and relatively undeveloped addition to public health laboratory work in this area. To illustrate opportunities, for example, otitis externa is a widely prevalent and troublesome disorder common in summer months in the South. Physicians commonly call this entity "otomycosis" but recent studies have indicated that this is a bacterial rather than a mycotic infection. The modes of treatment are being radically changed as a result of bacteriological studies. Rightly or wrongly, swimming and the quality of water in pools and at our beaches are under suspicion. Here is but one of many neglected bacteriological diagnostic fields which warrant attention.

With the growth of veterinary public health has come the need to provide laboratory service for our public health veterinarians. The development of this work in Florida in the past 3 years has proved most interesting. The bacteriological diagnostic work in anthrax was new to us. Leptospirosis in cattle and dogs has come to the fore. There have been tests for a wide variety of poultry infections. Bacteriological studies of edible meats and in abattoirs have been revealing. Lacking a veterinary diagnostic laboratory in Florida, the veterinarians have looked to us. It proved practicable for a public health laboratory to provide diagnostic service in animal as well as in human infectious diseases. Wherever there is no animal diagnostic laboratory, interdepartmental cooperation, rather than separate and independent laboratories, would be economic and advantageous.

No progress in providing aid in the diagnosis of virus infections, other than rabies can be reported from Florida's public health laboratories. These new and newly recognized entities are of increasing importance. It appears probable that within one to two decades it will be standard practice in public health laboratories to use tissue cultures and embryonated eggs as well as serologic procedures and animal tests for rather routine diagnostic studies of virus diseases. State laboratories need to begin to provide opportunities for some of their workers to obtain training in the exacting field of virology.

Public health laboratories were developed as a result of the urgent pressure for the control of communicable diseases. There has been gratifying progress in this field and the laboratory has played an essential role. The goal of the virtual elimination of communicable diseases is beginning to be attained. In those infections in which there has been most progress in control, increasingly dependable laboratory diagnostic tests are required to identify accurately the residual infections. In such major diseases as tuberculosis and syphilis, there is much work ahead in satisfying the diagnostic laboratory needs; in others, notably the virus diseases, scarcely a beginning has been made. In communicable diseases, well acknowledged to be a responsibility of public health laboratories, there are still unmet needs and new opportunities.

In the above activities the laboratory is providing service to physicians, health officers, and epidemiologists. There is work also requested by sanitary engineers and sanitarians. There has been a recent marked increase in the examinations of water and milk in Florida. As local health departments have been organized in the State the quality of the water and milk available to the public has been checked more adequately. There are still localities in the State, and undoubtedly in every State, which do not receive this elementary public health protection. This work must continue and will undoubtedly expand.

New Responsibilities

The fluoridation of water has added a new responsibility. Periodic checks will be required at the water plants. It is the proper function of the public health laboratory to serve as a control laboratory; highly dependable findings on specimens submitted periodically will be required.

The chemical services appropriate for a public health laboratory are only beginning to

develop in Florida. At present this work includes: some diagnostic tests such as tests for protein in spinal fluid, hemoglobin tests which are given to the prenatal cases attending public health clinics, and check tests for the diabetes screening program. The service also includes the detailed chemical analysis of water and other miscellaneous chemical tests. But the toxicological problems are the ones of most interest and of highest importance, and their solution is a service needed by the law enforcement agencies of the States and their counties. Unless otherwise covered, this important field is open to public health laboratories.

The environment of the industrial worker properly receives special attention. Commonly, but in my opinion unfortunately, the industrial hygiene laboratory functions apart from the general public health laboratory. Concerned for so long with communicable diseases, the general public health laboratory was not well prepared for the responsibility of providing laboratory service to industrial hygiene units in health departments when that work was initiated. Eventually this work should be incorporated with the broadened activities of the public health laboratory. Such an arrangement will be economical, and with carefully selected personnel and desirable cooperative relationships it will be a more efficient organization of public health services than the widely prevailing present arrangement.

In the future it is probable that substantial attention will be given to air sanitation. Control of environmental pollution caused by radioactive substances may be required in many localities rather than in a few. The extent of laboratory participation in such activities cannot be estimated at this time.

In the past and largely at present, the public health laboratory has been and is a diagnostic laboratory performing simple tests in large numbers. In general, it has been given the type and number of personnel adequate only for this work. No laboratory can grow satisfactorily under these conditions. If laboratory personnel are to develop, and if laboratories are to retain able workers, satisfying opportunities for special studies must be provided. Moreover, there are numerous investigations which can be conducted only through public health facilities. An urgent need for the public health laboratory is to attain a satisfactory balance between diagnostic services and special studies, a development which is still at a very early stage.

What of tomorrow's work in the chronic diseases? It is reasonable to expect that case-finding programs will eventually be accepted as a proper field of public health activity. Useful tests to indicate the probable occurrence of early malignancy or to detect chemical aberrations leading to arteriosclerosis could drastically modify the extent and character of laboratory work. When the Florida laboratory was organized, there was no serologic test for syphilis but now the performance of these examinations is a major activity. The early detection of predisposing causes or the early signs of chronic disease conceivably may be the major activity of the public health laboratory 50 years from now.

Educational Opportunities

In considering programs of the future, careful attention needs to be given to educational opportunities and responsibilities. It is well to examine programs of this type which have established their value in our sister bureaus. Seminars and short courses are an accepted part of the maternal and child health and venereal disease programs. More recently, educational programs of this type have proved notably effective in cancer, diabetes, and heart disease activities. They are designed solely to help the practitioner serve his patients better. Likewise, in the laboratory field, there are rich opportunities to aid clinical laboratory workers to provide more dependable and uniform results to the physicians they serve.

This will bring the public health laboratory into intimate contact with the medical technologists. Laboratory workers in the medical field need to develop as a professional body. There should be strong State and local organizations drawing together all those in this field who serve in hospitals, clinics, physicians' offices, private laboratories, public health laboratories, or elsewhere. In any such organization the bacteriologists, serologists, parasitologists and clinical chemists should join with the general

medical technologists. The public health laboratory is in a position to give leadership. Every influence must be used to assure that the strength of an organization of medical laboratory workers rests on its high educational value. In the future we can aid in bringing to maturity an allied professional body of high importance in the medical field. When this is attained, it will be natural to work with, or as a part of, this organized professional body and its allied State and local groups to improve the quality of laboratory practice—an activity which eventually should receive the endorsement and commendation of pathologists, medical practitioners, and the public they serve.

It has proved advantageous in Florida to work closely with laboratory personnel in the dairy industry. An annual refresher course giving detailed attention to selected problems, with opportunities for laboratory practice, has been received favorably. Representatives of the State Department of Agriculture, the dairy science division of the University of Florida, and the State Board of Health cooperated in planning the course which has served to draw together technologists from the dairy industry and the public health "control" laboratories. The initiative and leadership in this activity came from the State public health laboratory.

Educationally, there is a continuing need to participate in discussions at meetings of physicians, nurses, sanitarians, and others who use public health laboratory services.

Personnel Practices

The development of laboratory programs and planning for laboratory personnel must go hand in hand. There have been gratifying advances in personnel practices in public health. Retirement plans offer inducements for long-term career service. Salaries have been raised to a more adequate and equitable basis. These are some of the favorable features, but there are also weaknesses and problems.

Under any plan providing for slow advancement in long-term careers, there is always the possibility of losing the better workers, and, through personnel seniority policies, the possibility of having the less ambitious, the less imaginative, and the more easily satisfied persons in senior positions. The only solution to this potential problem is its prevention. There must be greater flexibility to permit the rewarding of exceptional persons; there must be even greater care in personnel selection, and especially in promotion to positions of senior responsibility.

Stagnation is a real hazard of career service and a particular risk to those in repetitive routine activity such as in the laboratory where large numbers of the same tests are performed day after day. There are safety devices here. Academic advancement is to be encouraged. We have been highly pleased with a cooperative relationship between the Florida State public health laboratory and the University of Florida, which permits promising junior workers to accumulate academic credits while employed and, equally important, which requires senior workers to teach. The limited investigations required for the master's degree thesis has stimulated keen interest in these activities. Workers advancing academically who are given opportunities and encouragement in research will not stagnate.

Laboratory work today is teamwork, not individual activity. This accentuates the importance of the problem of personnel management. The reliability of laboratory findings varies with the worker's emotions as well as his ability. Directors or departmental chiefs are managers of laboratory teams and need a sympathetic understanding of human emotions quite as much as technical skill and scientific knowledge. The laboratories of the future must be recognized above all as groups of human beings working together. Facilities, equipment, and reagents are required, but harmonious teamwork, just as much as material tools, determines the dependability of findings.

Summary

The record of the past has been written. During the first chapter of the history of the public health laboratory, attention was concentrated on the acute communicable diseases. Tests at first were employed largely for confirmation of diagnosis; later they were used in increasing numbers for case finding and the detection of carriers. More exacting tests by more expert personnel became essential for the

accurate identification of residual infections.

Major emphasis is directed to the chronic infections during the second and present chapter of the history. The need for simple procedures for case finding and for more highly sensitive and specific tests for diagnosis has become evident.

For the future, there are numerous unexplored problems in viral and other infectious diseases. Ahead, there is a call for continuing and increasing work in sanitary bacteriology, a broad development in public health chemistry, closer integration of all laboratory services provided at public expense, new and expanding work in chronic diseases, and an educational program designed to aid in improving the quality of medical laboratory service wherever it is performed. Special studies and active research programs will be required to encourage the development of laboratory personnel and to elevate the stature of the public health laboratory.

Looking to the future, we must obtain adequate facilities; acquire, train, and retain highly competent professional laboratory workers and aid each in attaining a highly satisfying and productive professional experience. Opportunities and needs of the future equal or exceed those of the past.

Amyotrophic Lateral Sclerosis

A major study of amyotrophic lateral sclerosis is under way on Guam where the disease is highly prevalent. The contributions of heredity and environment to the development of the disease will be investigated on the island which has a population that is relatively fixed. The National Institute of Neurological Diseases of the Public Health Service, the Bureau of Medicine and Surgery of the Navy, the Department of the Interior, and the Government of Guam are cooperating.

Amyotrophic lateral sclerosis is a degenerative disease of the nervous system which strikes most frequently between the ages of 30 and 55. There is no treatment for it. Its cause is unknown. Frequently assigned to the large class of demyelinating diseases of which multiple sclerosis is the best known, the disorder is pathologically characterized by demyelination of the brain and spinal cord—a breakdown of the fatty covering of nerve fibers. Popular attention was directed to it when Lou Gehrig, a baseball player, became one of its victims.

There seem to be two types: one, a slow progressive type primarily paralyzing the muscles of the hands and arms, and eventually affecting other organs; the other, a more rapidly progressive type, where shoulders, neck, tongue, lips, palate, and pharynx are initially involved and paralyzed. In the latter, the bulbar type, death by asphyxia or from aspiration pneumonia usually occurs within 2 years.

Whether amyotrophic lateral sclerosis is as prevalent on Guam as is believed, whether it is exactly similar to the disorder as it is known elsewhere, and what may be its possible cause or causes are objectives of the study. Neighboring islanders will also be studied to determine if the disease is typical for Guam alone or for other islands in the Marianas as well.

Cancer Morbidity Studies In Metropolitan Areas

Two out of five patients with newly diagnosed cancer will die within 1 year unless a better record of early diagnosis is made; more than 500,000 new cases of cancer will be diagnosed in 1953; but only half of these new cases will be diagnosed while the cancer is localized, according to estimates made by the biometrics section of the National Cancer Institute, Public Health Service.

The recently completed studies on cancer morbidity in 10 metropolitan areas indicate that the current outlook with respect to the survival of cancer patients is not favorable. That the survival of cancer patients depends largely on the stage of the disease at time of diagnosis—whether the cancer is localized or has spread beyond the primary site—is strongly pointed up by the reports. The more accessible the cancer site to direct examination, the greater is the opportunity for its early discovery. Half of all cancer involves sites accessible to direct examination. Exclusive of skin cancer, 48.2 percent of all cancers in females and 22.6 percent of all cancers in males are located in accessible sites.

Only 64 percent of newly diagnosed cancer cases survived 1 year, acording to the studies. When skin cancers, which have a high cure rate, are excluded, the survival rate is reduced to 58 percent. Among cases diagnosed while the cancer was localized, 84 percent of the patients survived 1 year. This rate may be compared to the 1-year survival of the 58 percent who were diagnosed after regional involvement had occurred and the 28 percent who were diagnosed after remote spread of the disease.

Cancer of the uterus provides a striking illustration of the effect of stage of disease at time of diagnosis on survival; the 1-year survival rates were 91 percent for localized cases, 71 percent for cases with regional metastasis, and 36 percent for those diagnosed after remote metastasis had occurred.

Except for skin cancers, the percentage of cases diagnosed while localized is low for cancer developing at sites accessible to direct examination. These sites are: skin, prostate, rectum, mouth and pharynx, thyroid, breast, and uterus.

In cancer of the breast, a highly accessible site, only 2 out of every 5 cases are diagnosed while localized (40 percent). The proportion is less than 3 out of 5 for cancer of the uterus (57 percent), and it is 1 out of 2 for cancer of the prostate (50 percent). For cancer of the rectum in both sexes, the proportion is less than 1 out of 2, or 45 percent for males and 46 percent for females.

The cancer morbidity series cover Atlanta, New Orleans, Birmingham, Dallas, San Francisco, Denver, Chicago, Detroit, Pittsburgh, and Philadelphia. These cities were originally surveyed by the National Cancer Institute in 1937–39 and were resurveyed in 1948–49.

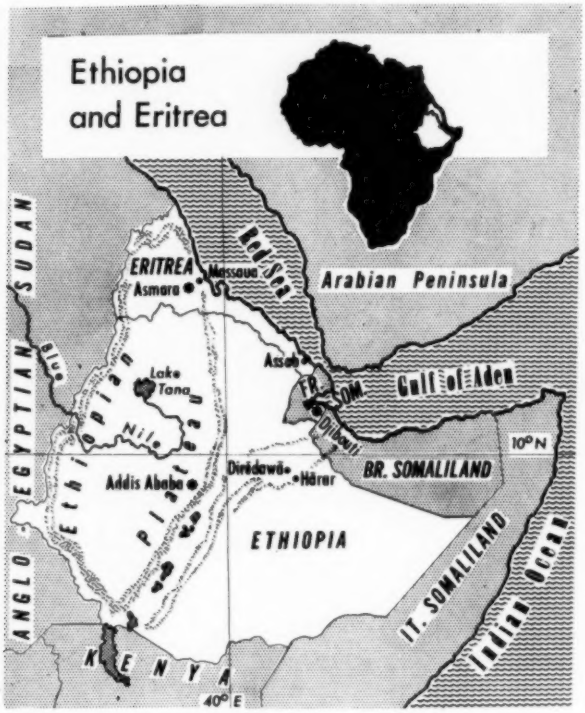
In preparation is a summary report which will provide comparative statistics for the two survey periods on cancer incidence, prevalence, and mortality as well as the relationship of cancer to such factors as primary site, sex, age, and race.

Separate reports of the 10 survey areas, covering both survey periods, have already been published. The reports on the 1948–49 series have been reviewed in recent issues of *Public Health Reports*. Inquiries concerning the series should be directed to the National Cancer Institute, National Institutes of Health, Public Health Service, U. S. Department of Health, Education, and Welfare, Bethesda 14, Md.

Reported by the National Cancer Institute, National Institutes of Health, Public Health Service.

Mapping a Program Of Public Health For Ethiopia And Eritrea

By HENRY R. O'BRIEN, M.D., M.P.H.



Historically significant because of its fierce resistance to political and cultural invasion for 16 centuries, Ethiopia is today undergoing many crucial changes . . . Being officially welcomed are scientists, teachers, and health workers from other lands, who seek to introduce to this country the benefits of modern advances in medicine and public health . . . One of these public health workers reports his field observations on some of the health problems he found and some of his suggestions for their solution.

ETHIOPIA and Eritrea—politically independent, and since September 1952 federated by a decision of the United Nations General Assembly—are experiencing the ferment that has enveloped all Africa.

Both countries lie historically and geographically between the world of the Arabs, the eastern Mediterranean Sea, and equatorial Africa. Together, they form a rich agricultural reservoir of grain, cattle, and coffee.

In May 1951, a representative of the Technical Cooperation Administration (now a part of the Foreign Operations Administration) visited Ethiopia to discuss cooperative programs. Soon afterward, the Imperial Government of Ethiopia, through the American Embassy in Addis Ababa, invited the Public Health Service of the United States to send a representative to Ethiopia to "recommend a specific project for public health preventive measures."

This report is an accounting of the observations of health conditions in Ethiopia and Eritrea and the recommendations which were made.

The Land and the People

Situated in the northeast corner of Africa, Ethiopia, known also as Abyssinia, is more than a third larger than the State of Texas. Its population is between 10 and 20 million.

Most of the country lies on a high plateau, reaching as high as 9,000 feet above sea level, and rising in sharp escarpments from the plains on the east and west and more gradually on the north and south. The plateau has been cut in deep gorges by the erosion of the Blue Nile, its tributaries, and other rivers, and is divided by the great Rift Valley.

The country is largely deforested. Heavy rains come in June through September, with lighter rains in February and March. Temperatures at 8,000 feet may fall from a high of 85° F. during the day to 40° F. in the early morning.

The size of the State of New York, Eritrea lies on the northern tip of the Ethiopian plateau. The high land gives way to an intermediate level on the east and west and then finally to the deserts of the Sudan (on the west) and to the narrow coastal plain along the Red Sea.

There is less water in Eritrea and more deforestation than in Ethiopia. Eritrea is a little warmer. Its roads and communications are noticeably better than those to the south in Ethiopia. Grains are the chief crop on the plateau, and some coffee is grown there. Cotton is raised in the western section. The people number between 1.2 and 1.8 million.

The ancestors of the Ethiopians came from southwest Arabia some 3,000 years ago, but the original Semites intermarried extensively with the Hamitic or Berber strains of northern Africa. Conquered negroid tribes are found in the south and west.

Some 40 languages are spoken in Ethiopia. Amharic is the first official tongue, and English the second. In Eritrea, the official languages are Arabic and Tigrinya, which is related to Amharic. In both countries, instruction in the schools, beginning with the fifth grade, is in English.

Ethiopia has long been a part of the eastern Mediterranean world—ever since Greek vessels sailed down the Red Sea. Christianity was first introduced in 350 A.D., and a Coptic Church developed, which has maintained itself in sturdy independence for 16 centuries. From the eighth century on, Moslem waves swept over much of the surrounding area and threatened Ethiopia again and again. Isolated by its fiercely hostile neighbors, Ethiopia was known to Europe only through rumors as the "land of Prester John," the legendary medieval priest and king. Today, the people of both Ethiopia and Eritrea are Copts, Moslems, or pagans. These groups live together harmoniously.

In the European rush for territory in Africa during the late 1800's, Eritrea came under Italian control. Ethiopia was threatened with conquest too, but it remained independent until the Italian seizure in 1936. East Africa was liberated by British and other Allied armies in 1941. As a result of the long Italian occupation and the later British administration, the Eritreans are today more accustomed to Western ways than are the Ethiopians.

For the past century, the influence of the West has been increasingly felt in Ethiopia. Even when he was regent (from 1916 to 1930), Haile Selassie had started plans for the modernization of his country. His efforts were intensified on his coronation as Emperor in 1930. On his return from exile in 1941 after Ethiopia's liberation, the process began anew. The Emperor stresses education as the basis for general progress. He believes that advance must take place gradually on an even front—in health, education, agriculture, communications, and in-

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Dr. O'Brien bases his observations in this field report on the 3½-month survey of Ethiopia and Eritrea which he made in the latter part of 1952. Now a special assistant in Region III (Washington, D. C.) of the Department of Health, Education, and Welfare, Dr. O'Brien was formerly chief of the educational programs branch of the Division of International Health, Public Health Service.

Dr. O'Brien was stationed in Thailand with the Rockefeller Foundation at Bangkok from 1921–24 and with the McCormick (Presbyterian) Hospital in Chiengmai from 1926–30. During World War II, he visited 11 countries in the Near and Far East in connection with the medical activities of the United Nations Relief and Rehabilitation Administration. Between 1931 and 1943, Dr. O'Brien was engaged in State and local health work in Ohio, New York, and Connecticut. He is a commissioned officer in the Public Health Service.

The pictures in this field report are photographs taken by Dr. O'Brien.

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dustry. It is heartening to note Ethiopia's progress in recent decades.

It is not so long since the 12 provinces of Ethiopia, although giving allegiance to the Emperor, were largely autonomous, each with its own overlord and his subchiefs. As may happen in the evolution of government, power is now highly centralized. The Emperor makes the major decisions. Within a governmental department, the decisions are made either by its minister or by his director-general. The parliament, which is an appointive body, has been given some functions. The larger towns in the provinces are municipalities with authority to levy some local taxes. Their mayors are appointed.

There are the beginnings of industrialization in Addis Ababa, the capital of Ethiopia. The cotton mill at Dirēdawā employs 1,200 workers. A Dutch sugar plantation near Nazareth, 50 miles east of Addis Ababa, employs 2,700 Ethiopians. The great majority of the people, however, are farmers who live in tukuls, which are huts made of poles plastered with mud and roofed with thatch. The farmers use oxen to plow their fields. Large herds of cattle are raised for local consumption or as evidence of wealth. Coffee is the leading export, and hides are the second. Gold mines exist, but their output is not publicized.

Mapping a Program

Following briefing in Washington, D. C., by the Foreign Service Institute and the Technical Cooperation Administration, more information was obtained in Geneva and Alexandria, headquarters and regional office of the World Health Organization.

The first days in Ethiopia were spent in planning a schedule of observation and consultation. Contacts were made with the Ministry of Public Health, with the Ministry of Education, and with the Central Planning Board of the Imperial Government, which passes on all programs of cooperation with outside agencies, and with personnel of TCA and the American Embassy.

Five field visits by jeep, diesel train, or plane were made to representative communities in 7 of the 12 provinces. Visits were made to hospitals, leprosariums, dresser stations, community water supplies, schools for the blind, and to a prison. Calls were made on provincial governors, mayors, physicians, nurses, educators, and missionaries. "What do you think are the leading health needs of your area? How could they be met?" were among the questions put to them. Field observations and impressions were discussed with the Swedish adviser in public health and with the representative of the World Health Organization.

What are Ethiopia's needs in public health in the next 10 years? What is the order of priority? What steps are practical now? What does the Government itself want to do? How can this be made a part of a sound program? What is financially feasible, both for the Government and for the outside organization? Is the work likely to be continued when outside aid stops? What are the leading health needs in each province or municipality? How could they be met? These were typical of the questions to be considered in traveling about the country.

Ethiopia: Vivid Contrasts

There are wide contrasts in Ethiopia today. Young men are observed reading books or newspapers at the library of the United States Information Service in Addis Ababa. One notices the neat stone schoolhouse built in a provincial town by the Ethiopian Ministry of Education. Under a tree in a Coptic churchyard, three boys are reading aloud from a copy of the Psalms which was handwritten on pages of vellum. Other boys, clad in skins above their bare legs, herd cattle home through the chill dusk toward the mud-walled tukuls on a hill. They will probably never go to school. Only about 1 person in 200 of all the people in Ethiopia is enrolled in any school today.

At the airfield of a provincial town, a group of Ethiopians were waiting to fly 80 miles to the next stop. This trip would otherwise have taken a week on foot, perhaps a little less on muleback. Their destination was well beyond the strategic Italian-built roads radiating from Addis Ababa. A railroad climbs up to the capital from Djibouti in French Somaliland on the Red Sea. There is a telegraph

system in Ethiopia, and Addis Ababa has telephones and a radio station.

At a weekly market, to which people walk from miles around, a vendor may be seen selling little measures of salt brought up from the desert plains along the Red Sea. Another sells factory-wrapped cakes of soap of a well-known brand. Hand-forged spearheads are displayed in another part of the market and both foreign and domestic cloth in still another.

Some 15 communities, from the capital of Ethiopia to a small village, have public water supplies. Most of these are inadequate, and equipment is wearing out. Otherwise, the housewife carries water, often over long distances, in a clay jar from a spring or stream or waterhole. There are some septic tanks and pit privies in Addis Ababa. The municipality also collects rubbish. Harār has a few public comfort stations.

Health Conditions in Ethiopia

Although there are no epidemics at present in Ethiopia, the country is steadily drained by major endemic diseases. Syphilis and malaria, gonorrhea and the pneumonias seem to be the most prevalent. In the highlands, malaria follows the end of the rains. Lower down, it is endemic. Louseborne typhus is widespread: 8 cases were noted in 1 ward of a 100-bed hospital. Flea- and tick-borne typhus are also present. Relapsing fever is endemic. Amebic and bacillary dysentery are prevalent. Cerebrospinal meningitis appears in local epidemics from time to time. Tuberculosis is a serious problem and has increased since the Italian occupation. One estimate for the number of leprosy cases is 15,000.

Next to syphilis, wounds are the condition most frequently reported by the clinics. Trachoma, conjunctivitis, tropical sores, and rheumatic conditions follow. There is general malnutrition resulting from deficient diets and from periodic fasting. Some maternal deaths occur, most frequently from hemorrhage. Infant mortality is high. The village midwife is strangely absent in Ethiopia, but some training in midwifery has started in Addis Ababa. Instruction began in Asmara (Eritrea) some years ago. Scabies is widespread.

Ethiopia's Health Services

Public health first took a definite place in the Government of Ethiopia in 1942 as a bureau in the Ministry of the Interior. In 1947, the bureau became the Ministry of Public Health, which today is the center of health work in Ethiopia. The effectiveness of a health unit is measured by its organization, its program, its personnel, and its budget. Studied in each of these phases, Ethiopia has made distinct beginnings, but the country still has pressing needs.

The existence of a Ministry of Public Health is in itself a distinct achievement. There are now an acting Minister of Health and an experienced Director-General who handle administration for the Ministry. A Swedish physician with the title of Inspector-General serves as adviser to the Ministry. He is a trained public health worker who is devoted to Ethiopia. He speaks both Amharic and Galla. There are at present no Ethiopians in the country who are doctors of medicine. The Ministry has on its staff only 2 Ethiopian workers who are trained in public health: 1 had training in sanitation, and the other in statistics.

In the central office of the Ministry, there are separate bureaus handling administration, sanitation, statistics, foreign quarantine, and medical services. The bureau of medical services operates most of the hospitals in the country, either directly or by contract with one of the foreign missionary groups. The curative work of the Ministry, functioning through the hospitals, is at present its leading activity. Ethiopia has 38 hospitals with 2,315 beds (0.15 per 1,000 estimated population) and 3 leprosariums with 800 patients. There are some 80 physicians in Ethiopia, all foreigners, or 1 per 200,000 people.

The Ministry of Public Health places little emphasis on preventive medicine, although a good central laboratory for vaccine production and research and diagnostic work is developing in the Pasteur Institute of Ethiopia, an autonomous organization technically supervised by the Pasteur Institute of Paris under a contract with the Ministry of Public Health. The Institute also operates an anti-epidemic service, a function which gives it nominal supervision

(Left) Tukuls in a typical Ethiopian village near Addis Ababa. Graduates of the proposed school for medical assistants will serve people living in such communities. Eucalyptus trees like those in the background were introduced to Ethiopia in the nineties and now furnish firewood for the country.

(Center) Countrymen at a weekly market in Ethiopia. They are wearing Ethiopian shammas draped over Western khaki garments.

(Right) Part of the quadrangle at University College in Addis Ababa. The buildings house classrooms, well-equipped laboratories, and dormitories. 1952–53 enrollment was 100. Students can prepare for careers in medicine, veterinary science, dental surgery, pharmacy, agriculture, biology, and public health; also given are courses in arts and engineering.

over the venereal disease survey and control work in Ethiopia now conducted by the World Health Organization and over the BCG vaccination and tuberculosis control campaigns planned by WHO for 1953.

The Ministry is responsible for foreign quarantine at airports of entry at Asmara (in Eritrea) and at Addis Ababa and Dirēdawā (in Ethiopia) and at the newly acquired Eritrean seaports of Massaua and Assab.

It is a definite policy of the Government to charge fees for medical services. There is machinery for securing free medical care for the sick who cannot pay, but it does not always operate effectively.

The medical director of the leading hospital in each province is also appointed as health officer of the province, but he usually has only a clinical background and gives little supervision to health work, especially in the outlying villages. The municipality of Addis Ababa has the only full-time local health officer in Ethiopia.

There are no vital statistics available in Ethiopia although some municipalities are beginning to register births and deaths. Hospitals and dispensaries make weekly or monthly reports to the Ministry of Public Health on the people who come for treatment.

Disease outbreaks are usually reported to the governor of the province who, in turn, informs the Ministry of Public Health immediately. The Ministry will then request the Pasteur Institute to send an anti-epidemic team to the epidemic area. Each province has a varying number of dresser stations operated by men of little or no formal education who have been taught how to give first aid and how to use simple medicines.

In the Ministry of Public Health there is a medical advisory council to which a small number of foreign health workers, usually physicians, are appointed, and to which are referred matters of policy and disciplinary questions involving foreign physicians. It also receives applications for licensure from physicians, nurses, pharmacists, dentists, sanitary engineers, and others, and submits its recommendations to the Ministry. A subcommittee of the council serves as a medical education board which approves curriculums for nurses, dressers, sanitary inspectors, and others.

The Ministry of Public Health receives technical assistance from the World Health Organization under a basic agreement signed in July 1951. The Ministry feels that any program proposed by the Technical Cooperation Administration of the United States should be coordi-

nated with WHO programs. The World Health Organization has given 22 fellowships to send Ethiopian health workers abroad. In the fall of 1952, WHO personnel in Ethiopia included a public health administrator, a leprologist, and a venereal disease control team composed of a clinician, a serologist, and a nurse. Plans were being made for a WHO tuberculosis campaign in 1953.

Allied Health Services

There are many health activities outside the Ministry of Public Health. The Ministry of Education has a school health service, and the army has several physicians and hospitals of its own. Sixteen of the 38 hospitals, 2 of the 3 leprosariums, and numerous clinics are operated by missionary groups—Protestant and Roman Catholic, European and American—frequently with government subsidy. The missionary physicians are competent and are usually public-health-minded.

Local voluntary groups include the Ethiopian Red Cross Society, which supports a nurse-training school and is planning a village health education project; the Ethiopian Women's Welfare Society, which maintains a clinic in Addis Ababa; and the Young Men's Christian Association, which includes some health education in its program. Ethiopian Christmas Seals are sold to help finance antituberculosis activities.

Training Health Personnel

The problem of personnel, whether professional or subprofessional, is a pressing one in Ethiopia and faces every proposal for a public health program. After the liberation of the country from Italian control in 1941, a few Italian physicians were retained, and the Friends Ambulance Service and the British Red Cross began to train Ethiopians to meet some of their country's serious health needs.

A start was made in teaching dressers. Their work was labeled "first aid," but conditions frequently demanded much more than that. UNRRA (United Nations Relief and Rehabilitation Administration) workers emphasized the training of dressers in a standard 6-months' training course. The Interim Commission of the World Health Organization, and later WHO itself, prepared detailed outlines for dresser courses. Today there are about 500 primary and specialized dressers, with or without certificates, and several hospitals are training students to take the dresser examinations given by the Ministry of Public Health. Ethiopia probably needs at least 2,000 dressers.

The UNRRA missions also started short courses for sanitary inspectors. The World Health Organization has continued them. A few X-ray and laboratory technicians are trained on an apprenticeship basis. In the hospitals, women ward attendants are usually given on-the-job instruction after they start work.

It is important that the training of sufficient professionals accompany the training of subprofessionals since experience the world over demonstrates that subprofessional workers need professional supervision to keep up their standards.

In 1949 and 1950, WHO made a fresh appraisal of the needs for medical personnel and concluded that it was time to consider the long-term training of professional leaders. Ten young men were sent to Kampala (Uganda), Alexandria (Egypt), and Beirut (Lebanon) for 6 or 8 years of training as physicians. Four young women were sent to Kampala for 3 years of training in nursing. Three young men were sent to Kampala in 1950 for instruction in sanitation, and three more were sent to Beirut in 1952. The British Red Cross, the Imperial Government of Ethiopia, and private families are supporting other students in medicine. The Kampala nurses and sanitary inspectors will graduate and return to Ethiopia this year.

As a result of long-term plans in Ethiopia and the stimulus of the World Health Organization, 1 school of nursing was opened in 1949, another in 1950, and 2 more in 1951. Two of these schools are in Government hospitals; 2 are in mission institutions; and 2 of the 4 train young men as well as young women. All plan to meet the standards of the International Council of Nurses. In December 1952, the 4 schools had 86 students. The 2 schools which opened in 1949 and 1950 graduated their first classes in March 1953. Although the schools have weaknesses and needs, basic nursing is well

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established. The growth of basic nursing services will depend largely on the continued development of secondary education. Nurses are licensed by the Ministry of Public Health, and a nursing council is active under the medical education board.

Definite plans for local training of physicians are now under way. University College, which opened in Addis Ababa during 1950, accepts students who have passed the matriculation examination. It offers what seems to be a good premedical course and was to have been appraised by an accrediting committee from London in March 1953.

Meanwhile, funds have been collected from government workers to build the Haile Selassie I University in Addis Ababa. The university will have a faculty of medicine. A European businessman recently willed $750,000 in Ethiopian currency (US$300,000) for the new university. Bids have been invited for the first building which will include space for the first 2 years of a medical course. More than Eth$3,500,000 is in the bank for this building. (Eth$1.00 has an exchange value of US$0.40.) Classes are planned to start in October 1955, and an enrollment of perhaps 8 students in the first year of medicine is expected.

There are 2 schools of dentistry in Addis Ababa, 1 under the Municipal Department of Health, the other under the sponsorship of the former Minister of Public Health. Neither school has much in the way of equipment, curriculum, or faculty. The teeth of Ethiopians are excellent, and the country has much more pressing health needs than the early development of dental education.

With plans made and training under way for physicians, nurses, and dressers, there is no present provision for an intermediate type of health worker, who has much more training than a dresser receives and less than is required for a physician, to assist the latter and supervise the former.

Budget for Health

The present budget for the Ministry of Public Health is Eth$3,000,000 (US$1,200,000). With this the Ministry maintains its hospitals and other health work. It is evident that if the Ministry is to furnish the preventive medical and health services which the country so greatly needs, it must obtain additional funds. Ethiopia is at present operating within its means, aided by today's favorable price for coffee. Funds are being found for other worth-

(Top) A pumphouse of the municipal water system at Jimma (Ethiopia). About 15 communities in Ethiopia have public water supplies. Wells and springs are more common sources of drinking water.

(Below) Mother and child outside the municipal clinic at Asmara (Eritrea). Infant and prenatal care and other health services are provided at this clinic.

while projects in the Government. It is probable that when sound proposals are advanced by the Ministry of Public Health, with a prospect of professional and financial support from outside, approval of the Ministry of Finance and of the Emperor can be obtained.

The Recommendations

After consideration of these and many other points, and after discussing them with the Swedish adviser to the Ministry and with the representative of the World Health Organization, a tentative program was outlined for specific public health measures in Ethiopia. This was gone over orally with the chief of the TCA mission in Addis Ababa, and with his approval was presented to the Director-General of Health and to the Director of the Central Planning Board. Their advice was sought and their reactions were noted for use in the final recommendations. The final report was addressed to the TCA chief for transmission to the Ministry of Public Health.

In substance, the program included five recommendations:

A demonstration health department and field training school for medical assistants to be set up in one of the provinces, with cooperative support in supplying both staff and equipment from the Ministry of Public Health, the Technical Cooperation Administration, and the World Health Organization.

Three health workers to be assigned by TCA for immediate needs—a sanitary engineer to work with the Ministry of Public Health to improve community water supplies, another to be stationed by the Ministry in the Addis Ababa Municipal Department of Health, and a health educator to be loaned by the Ministry of Public Health to the Ministry of Education for training of teachers in school health.

More fellowships abroad in professional fields where such training is not available in Ethiopia. Properly used, such fellowships can advance public health in Ethiopia by a good many years.

A limited amount of badly needed equipment and supplies for the schools of nursing, and medical journals and reference books for the hospitals.

A chief of the health section of the TCA mission to maintain contact with the Ministry of Public Health, the World Health Organization, and the Technical Cooperation Administration for coordinating the above activities and for supervising the smaller health programs requested by Eritrea. He would also aid in plans for the medical school.

Eritrea's Needs

Only a week was available for a study of Eritrea, but that time permitted visits to the health institutions and to several schools in Asmara, and to a regional hospital, a health center, and a dresser station in the provinces.

A local government committee had worked out a possible health program with the TCA deputy director for Eritrea. It gave high priority to a request for schools of nursing, midwifery, and laboratory technique to be started at the 1,000-bed Civic Hospital in Asmara and also asked assistance in setting up a small leprosarium near Asmara.

As a result of the visit, the local requests were strongly indorsed as urgent steps, and suggestions were made for carrying them out as an interim program. One instructor was recommended for each of the three schools requested.

Acceptance of Proposals

From the point of view of technical cooperation, a study not followed by operations is sterile. The proposed program for Ethiopia was submitted by the Technical Cooperation Administration in Ethiopia to the Ministry of Public Health. The proposals were considered by the Central Planning Board and finally were placed before the Emperor.

As a result of the Emperor's approval, an agreement for cooperation in the field of health was signed by the Technical Cooperation Administration and the Ministry of Public Health at the end of April 1953.

What changes will come to Ethiopia and Eritrea after the proposed health programs have been put into operation remain to be seen. The study of the two countries and the recommendations which followed it are an earnest effort to help both Ethiopia and Eritrea at a strategic period in their development.

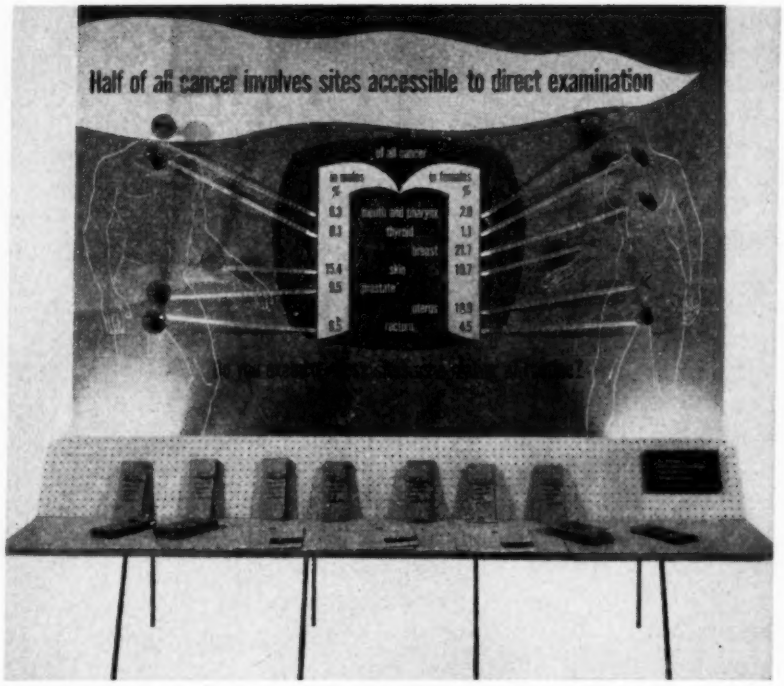
PHS exhibits

Cancer of Accessible Sites

"Half of all cancer involves sites accessible to direct examination," a new cancer control exhibit, was first shown at the annual meeting of the American Medical Association in New York City, June 1–5, 1953. Available for the use of medical societies, health departments, health associations, or any meetings of physicians, the exhibit is designed to encourage the early diagnosis of cancer. It points out to general practitioners the accessible cancer sites in both sexes and charts the percentages of all cancer occurring in these sites (see p. 975).

The exhibit has edge-illuminated, transparent male and female figures on a blue background. Easily assembled by one man, it has blinking lights and a shelf to accommodate publications. No transformer is necessary with a. c. current.

A threefold leaflet (Public Health Service Publication No. 324) is a facsimile of the exhibit.



Specifications: 1 panel 8 by 6 ft. in 2 sections; requires 8 ft. floor space and 1,000 watts a. c. Assembling instructions included with shipment. For loan, apply to: Cancer Reports Section, National Cancer Institute, National Institutes of Health, Public Health Service, U. S. Department of Health, Education, and Welfare, Bethesda 14, Md. Borrowers must pay insurance and shipping costs both ways. Shipping weight 560 lbs.

Rheumatic Fever Prevention

That "rheumatic fever is a recurrent disease which can be prevented" is stressed in an exhibit developed by the Public Health Service in cooperation with the American Heart Association. Based on the statement released in January 1953 by the Council on Rheumatic Fever and Congenital Heart Disease of the American Heart Association, the exhibit illustrates the pattern commonly observed in a typical case of rheumatic fever. It underlines the fact that year-round daily doses of sulfonamides or penicillin will prevent most recurrences of the disease.

Designed for professional audiences, the exhibit has been shown at the annual meetings of the American Academy of General Practice in St. Louis, Mo., the American Heart Association in Atlantic City, N. J., and the American Medical Association, New York.

Specifications: 1 panel 10 by 7 ft.; requires 10 by 6 ft. floor space; one 110 volt a. c. outlet. Assembling instructions provided. For loan, apply to: Division of Chronic Disease and Tuberculosis, Public Health Service, Department of Health, Education, and Welfare, Washington 25, D. C. Borrowers must pay insurance and shipping costs both ways. Shipping weight 300 lbs.

Epidemiological Study Of Plantar Warts Among School Children

By Walter K. Grigg, M.D.
and Gertrude Wilhelm, R.N.

AN EPIDEMIOLOGICAL STUDY of plantar warts among children attending the public schools in Dixon, Ill., was made by the school authorities and the Lee County Health Department during the school year 1951–52. The purposes of the study were (*a*) to determine whether or not an epidemic of plantar warts existed, and (*b*) to attempt to find significant factors in the epidemiology of plantar warts so that recommendations to prevent further spread might be made.

Despite the fact that plantar warts (verruca plantaris) are seen frequently in the general practice of medicine, relatively little has been written about them. The term plantar wart refers to any verruca located on the plantar surface of the feet. These warts may be single or multiple, multiple warts having either a haphazard distribution or that of a large wart with satellites (mother-daughter). The usual plantar wart is a hard yellowish or grayish lesion embedded in a small or large amount of hyperkeratotic tissue. On occasion the keratotic tissue may proliferate so freely that the lesion may be thought to be a callus. A diagnosis of verruca may be made if small black dots are found where the lesion is pared. These black dots represent vascular loops in the papillae of the corium and constitute the core of the wart.

Most plantar warts are presumed to have the same etiology as warts on other parts of the body (verruca vulgaris) (*1*). When they grow on a pressure point of the sole of the foot, however, most growth must be inward. Severe pain and disability may result, particularly if the plantar fascia is invaded. Possibly of different etiology are the mosaic plantar warts, which are flat and nonpainful and which have irregular outline. Paring of these warts reveals many individual cores, forming a pattern which leads to the term "mosaic." Mosaic plantar warts frequently occur in association with hyperhidrosis (*2*).

Dr. Grigg, now in general practice of medicine in Batavia, Ill., was at the time of this study acting health officer of the Lee County Health Department, Dixon, Ill. Miss Wilhelm is the school nurse of the Dixon public schools.

Attack Rate

The feet of all children attending the public schools in Dixon were examined at weekly intervals during the school year 1951–52 by the school nurse and physical education instructors. In a school population of 2,389 students, 107 cases of plantar warts were discovered, an attack rate of 4.47 percent. For each of the 107 cases, an epidemiology card was prepared and filled out. A statistical analysis of the information obtained from these cards is given in table 1.

As a control measure, it was necessary to determine whether the attack rate in the Dixon schools was an epidemic rate. The school children in the neighboring town of Amboy were therefore examined in May 1952. In a school population of 275, only 2 cases of plantar warts were discovered, an attack rate of 0.72 percent. The two groups being comparable, a difference of 3.75 percent between the rates represents a standard error of difference of 0.6653 percent.

Table 1. Number of cases of plantar warts and attack rate among city school children in Dixon, Ill., by school, 1951–52

School	Number of students	Number of cases	Attack rate (percent)
Loveland (grade school)	128	4	3. 13
Lincoln (grade school)	719	25	3. 48
North Central (grade school)	469	16	3. 84
South Central (grade school)	429	22	5. 13
Dixon High School	644	40	6. 21
All schools	2, 389	107	4. 47

Table 2. Number of cases and attack rate of plantar warts among students in grades 4 through 8, according to availability of showers

School	Number of students	Number of cases	Attack rate (percent)
	Showers available		
Lincoln	382	22	5.76
South Central	217	18	8.29
Both schools	599	40	6.67
	Showers not available		
Loveland	38	4	10.53
North Central	293	16	5.46
Both schools	331	21	6.04

Thus, the difference is well outside the realm of chance, and it is assumed that an epidemic of plantar warts occurred among the school children in Dixon. It is realized, of course, that a year-long survey of the children in Amboy, such as was conducted in Dixon, might have yielded a greater number of cases and a higher attack rate.

Availability of Showers

No showers were available for the students in the North Central, the Loveland, and the first three grades of the Lincoln and South Central schools. Showers were available for the remainder of the students. A comparison of the number of cases and the attack rate of plantar warts among students taking showers with the number of cases and the attack rate among students not taking showers is shown below:

	Number of students	*Number of cases*	*Attack rate (percent)*
Showers not available	1,146	27	2.35
Showers available	1,243	80	6.44

The factor of age, however, must be compensated for in interpreting these figures since all students not taking showers were in grade schools, whereas the students taking showers were in both grade and high schools. Therefore, a comparison was made between the two grade schools with shower facilities and the two grade schools without shower facilities omitting the figures for the first three grades (table 2). A ratio of 0.38 exists between the difference in the attack rates for these two groups (0.63 percent) and its standard error (1.67 percent). Thus, the difference is so small in comparison with its standard error that showers are neither implicated nor absolved as a causative factor in the epidemic.

Both the Lincoln and South Central schools use foot baths and powderboxes in their shower rooms, and all showers and shower rooms are scrubbed nightly with a strong antiseptic solution. No statement can be made as to the effect that these preventive measures had on the attack rate since there was no group in Dixon with which to compare them.

Incidence by Sex and Age

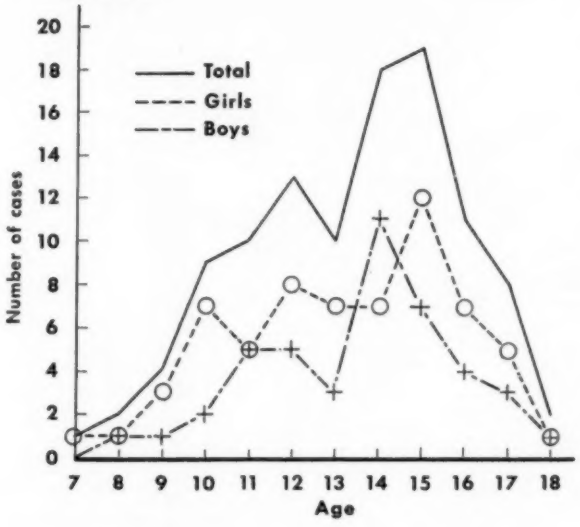
As shown in table 3, there was a higher incidence of plantar warts among girls than among boys: 59.8 percent of the cases occurred in girls. The difference between the attack rate for girls (3.48 percent) and for boys (5.55 percent), 2.07 percent, bears a ratio of 2.44 to its standard error, 0.88 percent. This difference could occur by chance only about 7.3 times in 1,000 and is therefore significant. Watkins also reported a higher incidence of plantar warts in girls, 62.9 percent (*3*). No reason for the higher incidence in girls has been determined.

The greatest number of cases for all students occurred at age 15; the greatest number for boys, at age 14, and for girls, at age 15 (see chart).

Table 3. Number of cases of plantar warts, by sex

School	Number of students		Number of cases	
	Boys	Girls	Boys	Girls
Dixon High School	303	341	16	24
Loveland	66	62	4	0
South Central	234	195	11	11
Lincoln	394	325	4	21
North Central	238	231	8	8
All schools	1,235	1,154	43	64

Distribution of cases of plantar warts among school children in Dixon, Ill., by sex and age, 1951–52.



The following tabulation shows the number of students observed in each grade:

Grade	*Number of students*
Kindergarten	271
1	177
2	161
3	234
4	180
5	184
6	171
7	173
8	170
9	213
10	188
11	150
12	117

Other Data

The number of cases of plantar warts discovered in each month of the school year 1951–52 were as follows:

Month	*Number of cases*
(Before July)	3
July	3
August	5
September	5
October	6
November	4
December	6
January	10
February	20
March	23
April	17
May	5

The epidemiological investigation also revealed the following data: All 107 of the students with plantar warts participated in physical education classes. Thirty-six of these students participated in interscholastic sports; 71 did not. Ninety-three of the 107 students swam in the Dixon swimming pool during the summer; 14 did not.

Incubation Period and Etiology

Investigators have attempted to determine the incubation period of verrucae vulgares through inocculation experiments on humans. They have found the incubation period to be 1 month, 3 months, 6 months, 8 months, and 20 months. The fact that material from verrucae injected into the normal skin will cause a wart to appear is presumptive evidence that warts are caused by an infectious agent, though no etiological agent has ever been isolated from a wart. Most investigators believe the agent is a virus (*1*).

As a part of this study a number of specimens of plantar warts were removed surgically and sent to the University of Michigan Virus Laboratory for study. All efforts to isolate a virus proved unsuccessful.

Type of Warts and Location

No mosaic plantar warts were found. Seventy-nine students had single plantar warts; 28 had multiple warts. One interesting fact was that 11 students had verrucae on other parts of their bodies. The distribution of these lesions were: hands, 7; arms, 3; and knee, 1. The incidence of verrucae on the body among the general school population was not determined. However, the fact that 10.28 percent of the children having plantar warts had verrucae on other parts of the body, 91 percent on parts that probably would come in contact with the feet, appears significant.

Ninety-three of the 107 patients had one or more verrucae located on a pressure point—base of heel, longitudinal arch, metatarsal arch, or base of toes. This figure is considered significant. Many investigators have previously presented the theory that trauma is a significant factor in the etiology of plantar warts. The locations on the feet were: metatarsal arch,

Table 4. Incidence of plantar warts among other members of the families of children having plantar warts and of control group

Group	Number of letters returned	Number of families having other members with warts	Attack rate (percent)
Families of children with plantar warts	30	7	23.3
Families of children without plantar warts	22	5	22.7

55; toes, 28; heel, 18; longitudinal arch, 6; and other parts of the foot, 11. (The total of 118 is due to the fact that some children had warts on several parts of their feet.) There were approximately an equal number of warts on the right and left feet.

Family Members Having Warts

Since plantar warts and verrucae vulgares are presumed to be infectious, the incidence of warts among other members of the family was investigated. A form letter was mailed to the parents of each student who had plantar warts, requesting that the feet and body of each family member be examined for warts. As a control measure, letters were also sent to an equal number of parents of school children not having plantar warts. The children in the control groups were of the same age and sex and in the same schools as the children with plantar warts. The results of this investigation are shown in table 4. There does not appear to be a significant difference in incidence between the families of the patients and the families of the controls.

Summary

During the school year 1951–52, 4.47 percent of the students in the Dixon public schools were discovered to have plantar warts. An examination of the school children in the neighboring town of Amboy in May 1952 revealed an attack rate of only 0.72 percent.

A comparison of schools where showers were not taken with schools where showers were taken (and foot baths and powderboxes utilized) failed to reveal a significant difference in the attack rates.

Girls showed a higher incidence of plantar warts than boys. The greatest number of cases in boys occurred at age 14; in girls, at age 15.

The incubation period was not determined; the greatest number of cases, however, had their onset in February, March, and April.

Seventy-nine students had single plantar warts; 28 had multiple warts. Eleven of these students had verrucae on other parts of the body. The percentage of school children having verrucae on other parts of the body was not determined, but the fact that 10.28 percent of the children with plantar warts had warts on other parts of the body is considered to be significant.

Pressure points were the site of 86.7 percent of the plantar warts. Since trauma would most likely occur on a pressure point, trauma may be a factor in the development of a plantar wart, as has been suggested by many investigators.

Plantar warts are thought by the authors to be related to verrucae vulgares. Many investigators have shown that material from verrucae can be inoculated into the skin of the same person or other persons and produce verrucae, suggesting that warts are infectious. The University of Michigan Virus Laboratory was unable to isolate a virus from specimens of plantar warts sent to them during this study.

ACKNOWLEDGMENT

The assistance of the following persons is acknowledged: Dr. Charles F. Sutton, Dr. Jackson Birge, and Isabelle Crawford, Illinois Department of Public Health; Dr. Thomas Francis, Jr., and Dr. John Morley, University of Michigan School of Public Health; the principals and physical education instructors of the Dixon and Amboy public schools; and Fern Hicks, Mary Wheatland, and R. G. Thomas, Lee County Health Department.

REFERENCES

(1) Van Rooyen, C. E., and Rhodes, A. J.: Virus diseases of man. New York, Thomas Nelson and Sons, 1948. 1202 pp.

(2) Montgomery, A. H., and Montgomery, R. M.: Mosaic type of plantar wart. Arch. Dermat. & Syph. 57: 397–399 (1948).

(3) Watkins, M.: Plantar warts in school children. M. Officer 79: 198–199 (1948).

A Program for Protection Of Research Employees Against Pathogenic Hazards

By James Black, John M. Lynch, M.D., and Irving Ladimer

IN THE PROCESS of investigating complex medical and biological problems, laboratory personnel become exposed to a wide variety of potentially severe hazards created by the chemical, biological, and radiological materials they handle. At the National Institutes of Health of the Public Health Service, this is true perhaps to an even greater degree than in many laboratory organizations.

Laboratory-acquired infections have been a source of danger to scientists not only because of the difficulty of safeguarding against known pathogens in small, compact work spaces but, of more importance, because of the possible presence of unknown organisms. From the early days of the Public Health Service Hygienic Laboratory down to the present extensive network of laboratory and clinical facilities at the Institutes, concern for the safety of investigators and technicians has been paramount. Laboratory hazards of this type are, of course, not unique at the National Institutes of Health (*1–4*), but its management and control of the problem appear worthy of report.

The National Institutes of Health was among the first of scientific institutions to develop a comprehensive program, which, following a severe outbreak of Q fever among the staff, was symbolized by the construction of a special memorial laboratory. The building, designed especially for the safe study of highly infectious diseases, physically embodies an integrated safety-health program emphasizing prevention, control, and accurate reporting. The program operates on a quiet day-to-day basis through the efforts of the investigators who by specific instruction and exhibition of good work habits provide continuous education for the technician.

The Institutes employ about 3,000 investigators and technical aides to increase knowledge leading to prevention and cure of neoplastic, mental, cardiovascular, neurological, dental, microbiological, and metabolic diseases. The problem of safety is a continuing one of high priority. To cope with this problem, emphasis is placed on integration of physical safeguards into all the newer buildings, on observation of safe operating techniques, and on application of medical controls for all employees engaged in hazardous tasks.

Mr. Black is the safety officer, Dr. Lynch, the medical officer in charge of the employee health service, and Mr. Ladimer, the assistant to the director, research planning branch, at the National Institutes of Health, Public Health Service.

Promoting "Hazard-Consciousness"

All preventive programs at the Institutes are based on the principle that the supervisor is responsible for the maintenance of a safe working environment. He is aided in this responsibility by the safety engineer, the radiological safety officer, and the medical officer of the employee health service.

The safety engineer fosters the development of a comprehensive program to create an atmosphere for hazard-awareness at all levels of employment. Each institute has its own safety committee which acts as a liaison between the laboratory chief and the employees, makes periodic inspections, and recommends safe-practice policies.

Protecting Against Pathogens

Although the safety committees of the National Institutes of Health concern themselves with all phases of safety, only the precautions used to minimize the possibility of infection from pathogenic organisms are described here.

Microbiological operating techniques necessitate a myriad of safe practices that form an integral part of procedure but which are rarely presented in the literature. Especially for the benefit of new workers, one of the chapters of the National Institutes of Health manual, Safe Practices, contains a guide to safe microbiological practices, some of which,

relating to aerosols, are outlined below. This guide consists essentially of a recording of safe techniques developed by the investigators and technicians over a period of many years.

1. All glassware containing infectious materials must be autoclaved before it is sent to the central glass wash unit. It cannot be left in the autoclave room unattended, and the can containing the glassware must bear an identification form (fig. a) showing the investigator's name and the length of time the material has been sterilized. Such equipment as broken syringes, broken glassware, or capillary pipettes that are likely to cause accidental lacerations or inoculation of the glass-room personnel should be autoclaved separately and discarded in "broken glass" receptacles.

2. Waring blendors containing infectious materials must be operated behind the closed sash of an exhaust hood (fig. b). Four vertically positioned ultraviolet lamps automatically turn on when the sash is lowered, and the exhaust chamber is provided with an electrically heated sterilizer.

A red jewel light indicates when the sterilizer element has attained its operating temperature of 700° F. Unless proper procedure directs otherwise, the blendor should not be opened immediately after its operation. Other recommendations to minimize the danger of aerosol hazards are:

Modify blendor to provide vaccine stopper to allow fluid to be drawn off without opening top.

Perform operation in a sterile chamber that can be decontaminated by one person in case of accident.

Provide a light plastic cover to prevent spraying of the hood chamber in the event a leak develops in the rotor bearing.

In the use of centrifuges, particularly where higher than usual speeds are involved or long periods of centrifuging are necessary, it is a good idea to make a preliminary check of the actual glass centrifuge tubes that will be used with the infectious agent.

3. When infectious material is being filtered, a trap containing an appropriate germicide should be placed between the filtering apparatus and the source of vacuum (fig. c). To further decrease the possibility of contamination to the vacuum line or pump and to minimize aerosol formation when the apparatus is disassembled, cotton plugs may be placed in the filter flask side arm, in the glass connecting tube between the two flasks, and in the glass tube connecting the trap with the source of vacuum. It should be set up in such a manner that the complete system can be easily autoclaved at the end of the experiment or periodically.

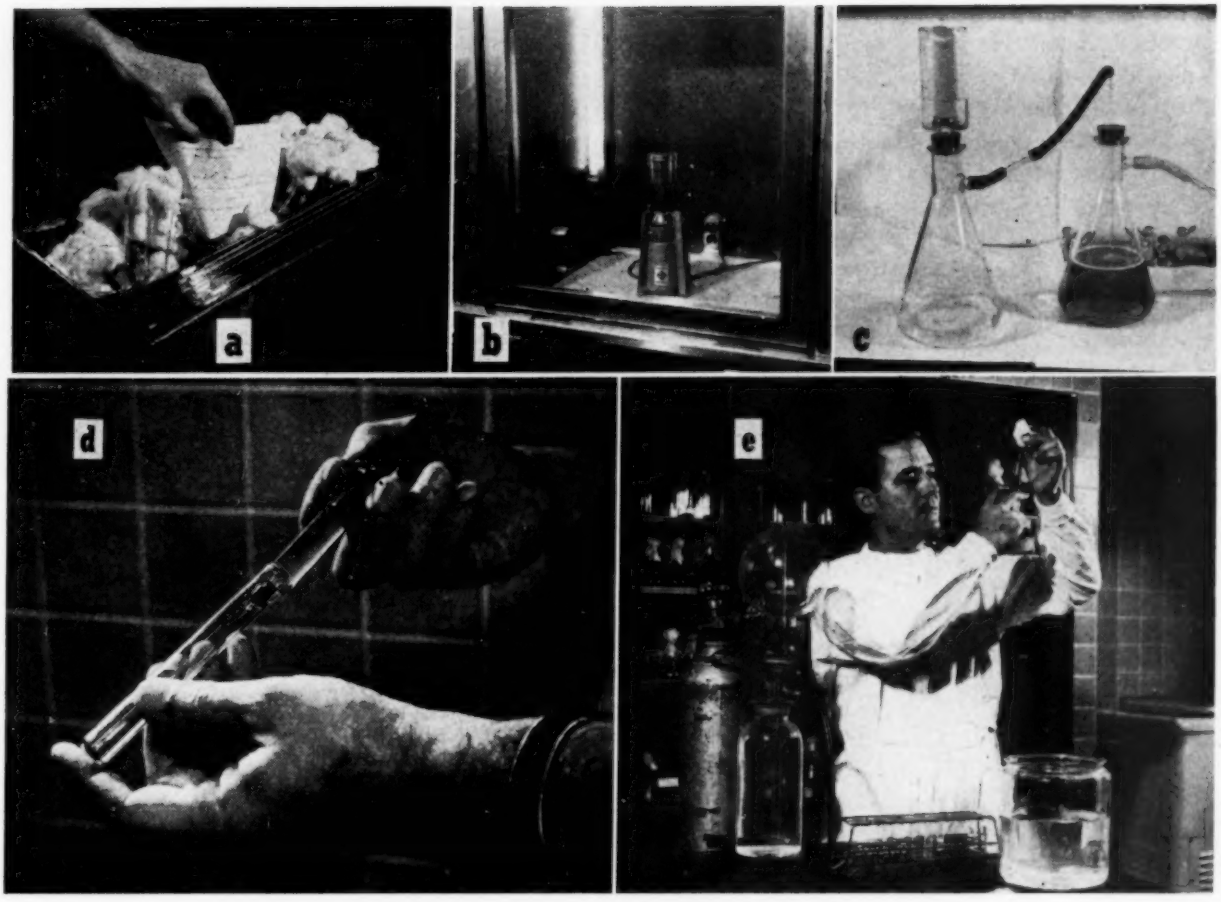
4. While infectious materials are being handled, the needle end of the syringe should be placed in an empty test tube to protect the technician against accidental puncture (fig. d). This technique will also minimize the possibility of contaminating the needle and will prevent droplets of infected material from contaminating work surfaces.

Syringes of the Luer-Lok type are recommended. Needles should be kept sharp, held securely and accurately in place, and oriented to prevent accidental spraying of assistant. Extreme care should be exercised during intranasal inoculations. Flame-sterilizing of the needle assembly should be done with caution to prevent cracking of the glass cylinder.

5. New workers should be made conscious of the fact that infection can be spread easily by touching equipment such as doorknobs, drinking fountains, sink faucets, and telephones, or by touching their own faces. Workers handling infectious materials should not be interrupted by the telephone. Awareness of the potential hazards involved in smoking, eating, or storing lunches in areas where infectious organisms are being handled should be stressed to the newly assigned aides.

6. The ease with which infectious aerosols can be created is also stressed in the safety manual. Aerosols can be caused when long needles of small gauge are withdrawn from tubes, setting up vibrations, or when needles are withdrawn from vaccine caps unless guarded with a wet cotton pledget (fig. e).

After flame-sterilizing a needle, the operator should hesitate momentarily before plunging a hot needle into infectious material. No solution should be prepared by bubbling expiratory air through infectious liquid, nor should



Protection against pathogenic hazards.

liquid be blown from pipettes in a manner to cause an aerosol.

Medical Examinations

The medical officer of the employee health service provides periodic physical examinations, laboratory tests, X-rays, and immunizations for those employees who are working in areas where such services are required. He is responsible for notifying the individual employee of the date on which he should report for examination. At least quarterly, the laboratory chiefs are required to provide the medical officer with a list of all personnel who are exposed to infectious organisms, and, in coordination with laboratory chiefs, the medical officer determines the type and frequency of medical control to be used.

With these data on the specific locations and nature of the various organisms, the medical officer keeps the maintenance organization informed concerning specific hazards. The maintenance department is responsible for restricting its employees from the locations specified by the medical officer until the maintenance men have received the proper health safeguard.

Periodic chest X-rays are made of all employees exposed to infectious diseases, such as tuberculosis and histoplasmosis, that produce demonstrable pathology before outward symptoms can be detected. Employees working directly in the tuberculosis research unit receive chest X-rays at 3-month intervals, while employees with patient-contact duties in infectious and tropical disease areas of the Clinical Center at the Institutes receive chest X-rays at 6-month intervals. In addition, individuals with arrested tuberculosis and those who have had recent intimate contact with known active tuberculosis patients, are given appropriate followup chest X-rays. Employees working

with or exposed to monkeys are followed closely by chest X-ray for early signs of tuberculosis, since it is now well recognized that monkeys may act as a serious source of tuberculosis. As further protection, the monkeys themselves are tuberculin-tested when they arrive at the Institutes and at 6-month intervals thereafter; positive reactors would either be transferred to the tuberculosis research unit or be eliminated from further research projects entirely.

All employees working with or exposed in any way to infectious disease agents in their work, are urged to come to the employee health service whenever they have any illness, particularly febrile illness. Thorough evaluation and followup is conducted to determine possible relationship with the working environment. Employees who become ill at home, and who are unable to come to work, are urged to call their family physician who may call, if he desires, the employee health service or the employee's supervisor for information regarding the working environment. In any event, the ill employee is urged to report to the employee health service as soon as possible.

All employees in infectious disease areas are asked to provide a blood specimen every 6 months. The blood is frozen and stored for study and for comparison with blood taken in future examinations. In the event of suspected occupational disease, serums are then available for diagnostic paired studies and other determinations utilizing serum.

Every 6 months, a serology test is performed to check employees working with *Brucella*. All employees directly or indirectly exposed to Q fever are immunized. Employees are encouraged to have tetanus toxoid inoculations.

In general, any applicant for employment at the National Institutes of Health with a preexisting condition, which would make him more susceptible than the average individual to infectious diseases, would not be assigned to areas where microbiological research is being conducted.

REFERENCES

(*1*) Sulkin, S. E., and Pike, R. M.: Survey of laboratory acquired infections. Am. J. Pub. Health 41: 769–781 (1951).

(*2*) Long, E. R.: The hazard of acquiring tuberculosis in the laboratory. Am. J. Pub. Health 41: 782–787 (1951).

(*3*) Smadel, J. E.: The hazard of acquiring virus and rickettsial diseases in the laboratory. Am. J. Pub. Health 41: 788–795 (1951).

(*4*) Sulkin, S. E., and Pike, R. M.: Laboratory-acquired infections. J. A. M. A. 147: 1740–1745 (1951).

Grain Sanitation Committee Organized

An Advisory Committee on Grain Sanitation has been appointed by the Departments of Health, Education, and Welfare and of Agriculture to recommend a program to improve the cleanliness of wheat and to reduce economic losses caused by insects and rodents.

The work of the 17-member committee has been described by its chairman, Dr. Charles Glenn King, scientific director of the Nutrition Foundation in New York City, as a cooperative attack on the problem of grain sanitation by Government agencies, the grain, milling, and baking industries, and the agricultural colleges.

At the committee's organization meeting August 11, three subcommittees were appointed. The subcommittees and their chairmen are:

Subcommittee on Education, chairman, W. H. Bowman, representative of Millers' National Federation, Chicago.

Subcommittee on Rodent Control, chairman, Dr. Harold Macy, dean of the Institute of Agriculture, University of Minnesota.

Subcommittee on Insect Control, chairman, Dr. R. C. Smith, head of the entomology department, Kansas State College.

Frequency of Accidents as Recorded In Family Surveys

Public Health Monograph No. 14 contains three studies of accident reports based on monthly visits to the homes of families living in certain blocks of the original Eastern Health District of Baltimore.

The first study pertains to the general aspects of accident frequency. The second indicates that more accidents occur in the home than in public places or at work, but the risk of accident per million hours spent in the home is much less than the risk in public places or at work. The third study suggsts that persons with chronic disease have more accidents during a specified period of observation than those who are free from such diseases.

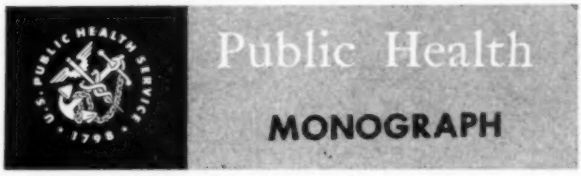
Part I. *Accident Frequency by Specific Cause and by Nature and Site of Injury. By Selwyn D. Collins, Ph.D., F. Ruth Phillips, and Dorothy S. Oliver.*

Annual illness of all severities and from all causes amounted in this study to 1,379 cases per 1,000 population, of which 125 (9 percent) were due to accidents. Of the 2,690 injuries in the 5-year period, 1,110 (52 per 1,000) disabled the patient for one or more days and the other 1,580 (73 per 1,000) did not cause loss of time from usual activities such as work away from or at home, housekeeping, or attending school.

In terms of total and of disabling cases, falls and miscellaneous ill-defined accidents were the 2 most frequent of 10 external causes. In terms of total accidents, lacerations, and superficial injuries were the 2 most frequent of 9 kinds of injury.

Falls are an important cause of both fatal and nonfatal accidents; motor vehicle accidents only exceed falls in fatal accidents.

The highest accident frequency occurs among children. Under 35 years of age, rates were higher for males than for females, but above 35 the reverse was true.



No. 14

The accompanying summary covers the principal findings presented in Public Health Monograph No. 14, published concurrently with this issue of Public Health Reports. The authors are with the Division of Public Health Methods, Public Health Service.

Readers wishing the data in full may purchase copies of the monograph from the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C. A limited number of free copies are available to official agencies and others directly concerned on specific request to the Public Inquiries Branch of the Public Health Service. Copies will be found also in the libraries of professional schools and the major universities, and in selected public libraries.

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Collins, Selwyn D., Phillips, F. Ruth, and Oliver, Dorothy S.: Accident frequency, place of occurrence, and relation to chronic disease. Public Health Monograph No. 14 (Public Health Service Publication No. 249). U. S. Government Printing Office, Washington, 1953.

A high proportion of all injuries involve some part of the head, particularly among children. In the ages under 5 years, head injuries occur three and five times as often among boys and girls, respectively, as the next most frequent site, hands and fingers. These injuries are mainly lacerations and superficial wounds rather than fractures.

The external cause of the accident was related to the nature and the site of the resulting injury. In nature of injury, fracture and joint injury combined was the highest category in four external causes of disabling accidents—motor vehicles, sports and recreation, falls, and miscellaneous external causes. Lacerations were highest in three external causes—falling objects, handling or striking objects, and in the use of hand tools. Lower extremity was the most frequent site of injury in five external causes—motor vehicle, sports and recreation, falls, falling objects, and other external causes; hands and fingers were the most frequent sites in three external causes—handling or striking objects, machinery, and in the use of hand tools.

All injuries of a given nature were examined to determine from which external cause they originated. Falls were either the first or second cause contributing to each of the four natures of injuries.

Part II. *Risk of Accident at Home, in Public Places, and at Work. By Selwyn D. Collins, Ph.D.*

Estimates of hours spent at home, in public places, and at work were made for the Baltimore surveyed population, with the aid of data from an intensive survey in Michigan. The observed accidents in the Baltimore group were classified by place of occurrence (home, public places, work), and accident frequency rates per million person-hours were computed for each of the three places. Such rates represent the risk of accident in each place rather than the volume of accidents.

According to the usual rates, which do not take account of the time spent in each place, home accidents in the Baltimore study were 27 percent above the simple average of accident rates in the three places; public and work accident rates were 8 and 19 percent, respectively, below the average. When hours spent in each place are taken into account, the situation is practically reversed: the home accident rate is 41 percent below the simple average of the rates in the three places, with public-place and work accident rates 16 and 25 percent, respectively, above the average of the three rates.

Age adjusted frequency rates for all accidents per million person-hours for the ages 15 and over are lowest for home, next for public places, and highest for work accidents. Age-specific rates are reasonably consistent in indicating the same order according to the size of accident frequency rates. Children under 15 years and particularly under 5 years have extremely high frequencies of falls on sidewalks, streets, and other public places per million person-hours spent in such places. Women experience more home and public-place accidents, particularly falls, than men in the same places, but they experience fewer work accidents than men.

Rates of actual days of disability per million person-hours indicate the same general order of the results of accidents in the three places, that is, work accidents have the highest rates; public places, the next; and home, the lowest of the three.

Several indicators of the severity of accidents, such as the percentage of cases disabling for 1 day or longer, average days of disability per disabling accident, percentage of disabling accidents that had 100 or more days of disability, and the percentage of disabling accidents that were fatal, all indicate rather consistently that work accidents are generally most severe, public-place accidents next, and home accidents the least severe of the three groups.

Part III. *Relation of Chronic Disease and Socioeconomic Status to Accident Liability. By Selwyn D. Collins, Ph.D.*

This study deals with the relation of chronic disease and socioeconomic status to the frequency of accidents.

The presence of chronic disease apparently adds to the liability to accident for the individual afflicted with the disease. A consistently higher percentage of individuals who had

repeated accidents during a specified period had some chronic disease than was true of individuals who had no accidents. This statement is true not only for all chronic and all major chronic diseases combined, but is true also for important specific chronic diseases and to some extent for minor chronic diseases also.

Consideration of males and females separately shows the same relationship of chronic disease to accident frequency for each sex.

Data were available on accident frequency in relation to only a few socioeconomic factors. Annual accident frequency rates per 1,000 population and the percentage of individuals who had repeated accidents within a given observation period were higher among manual workers of each sex than among professional-business-clerical workers.

Annual accident frequency rates per 1,000 population and the percentage of individuals who had repeated accidents within a given period were higher in the lowest income group than in the two higher income groups.

A higher percentage of individuals living in low-rent houses and of individuals living in low-value owned homes had repeated accidents than of those living in homes with higher rents or values.

Medical Research Fellowships and Grants

Awards for postdoctoral fellowships in cancer and medical research will be made in the early spring upon recommendation by the National Research Council. Applications for any of the following 1954–55 programs may be made by citizens of the United States, unless specifically noted, and must be mailed on or before December 10, 1953:

Cancer research fellowships, awarded by the American Cancer Society for study in all branches of the biological, chemical, and physical sciences and of clinical investigation applicable to the study of typical or malignant cancer growth.

Exchange fellowships in specialized cancer research, awarded by the American Cancer Society to United States citizens for advanced study in Great Britain.

Fellowships in the basic medical sciences, awarded by the Lilly Research Laboratories and to citizens of the United States and Canada by the Rockefeller Foundation.

Tuberculosis fellowships, granted by the National Tuberculosis Association to promote the development of investigators in tuberculosis-related fields. Applicants must be United States citizens who are graduates of American schools.

Support by the James Picker Foundation of candidates who propose to carry on research relating to the diagnostic aspects of radiology. Appointments are not limited to citizens of the United States.

Also, institutions may apply before January 1, 1954, for one or more grants to scholars in cancer research. A grant of $18,000 by the American Cancer Society, payable over 3 years, will be made to each scholar's institution as a contribution toward his support, his research, or both.

The fellowships are generally limited to candidates under 35. Information and application blanks may be obtained from the National Research Council, 2101 Constitution Avenue, Washington 25, D. C.

Trend of Multiple Cases of Poliomyelitis In Household Units

By MORRIS SIEGEL, M.D., M.P.H., and MORRIS GREENBERG, M.D., M.S.P.H.

INTEREST IN the occurrence of multiple cases of poliomyelitis in the household was stimulated by the urgent need for basic preliminary data in formulating recommendations for the use of gamma globulin in familial contacts and by the long-range objective of studying the household as a basic social unit. Epidemiological study of family units is particularly applicable to poliomyelitis because of the heavy localization of infection in affected households and the close association between host factors and the disposition to paralysis (*1–3*).

Investigations within the home by others have revealed the common prevalence of infection among family members at the time of or soon after the first case develops as well as the rapidity with which the virus is disseminated among household contacts (*4–6*). Consequently, when multiple cases do occur, they usually appear within a very short time of each other (*7*).

The foregoing clinical observations were confirmed in a recent epidemiological study of household infections in New York City, in which detailed data on age, time intervals, and other factors are given (*8*). In addition it was shown that the frequency of multiple clinical infections in the family was related to the number of susceptible persons in the household and to the annual attack rate of poliomyelitis. The association with incidence has been further explored in the present study because of its bearing on the evaluation of passive immunization in a community control program and on the broad problem of host-agent parasitism.

The method for determining the trend in the percentage of multiple cases during the year involved the tabulation by week of onset of (*a*) all reported cases, (*b*) first cases in families that had multiple cases, and (*c*) subsequent cases among the latter families. The difference between items *a* and *c* reveals the total number of newly affected families. This value divided into item *b* gives the weekly percentage of newly affected families with multiple cases.

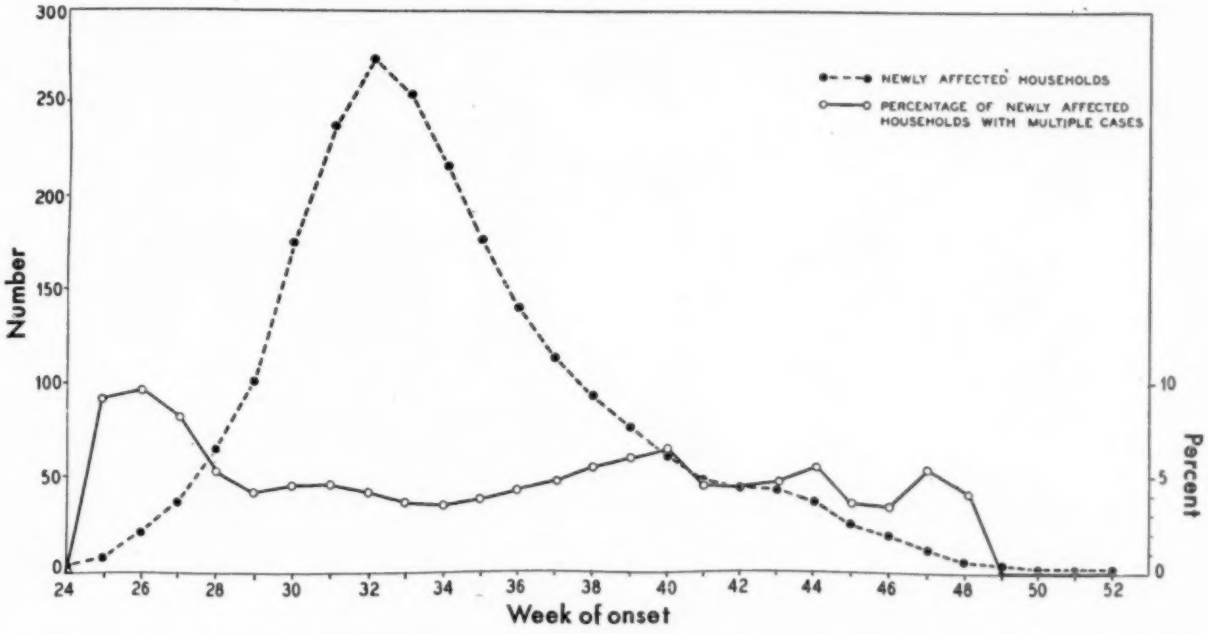
Because of the newness of the approach, the results obtained by this method of tabulation are given by week of onset in the table for 1949 and for the endemic years combined. The households with multiple cases appeared to be fairly evenly distributed during the year in proportion to the total number of families affected. This was reflected in the weekly fluctuation of percentages above or below the annual average of 4.4 for 1949 and 2.7 for 1950–1952. As expected, the weekly deviations from the annual average are usually greatest when the number of reported cases is smallest, and can be reduced by accumulating the cases over broader periods.

The Data

The conditions of the investigation have been described previously (*8*). The data available

Dr. Siegel is associate professor, department of environmental medicine and community health, College of Medicine, at New York City, State University of New York, and Dr. Greenberg is director of the bureau of preventable disease, New York City Department of Health, and assistant professor of epidemiology, School of Public Health, Columbia University.

Figure 1. Poliomyelitis cases in newly affected households and percentage of newly affected households with multiple cases by week of onset (3-week moving average), New York City, 1949.



were 4,886 cases of poliomyelitis reported to the New York City Department of Health from 1949 through 1952. About 61 percent were paralyzed, and 39 percent had evidence of central nervous system involvement without recognizable muscular weakness. The cases reported occurred in 4,708 households of which 167 or 3.6 percent had more than one case per household. In the endemic years of 1950, 1951, and 1952, when the incidence in the general population varied from 6.8 to 13.1 per 100,000, the percentage of affected families with multiple cases fluctuated between 2.4 and 3.0. In the 1949 outbreak, when the incidence of poliomyelitis reached 31 per 100,000 population, the frequency of multiple cases was 4.4 percent. Because of these differences in endemic and epidemic years, it was deemed desirable to study the trend of multiple cases throughout the year. The clinical and epidemiological data analyzed were obtained by medical inspectors who visited the home of every reported case as well as the hospital.

The foregoing data by week of onset are presented graphically in figures 1 and 2. The fluctuations in weekly values shown in the table were smoothed by using the conventional method of a 3-week moving average. Thus, each value shown on the graph represents the average number of households newly affected in the weekly period before, during, and after the specific week designated in the chart.

Horizontal Trend

In the epidemic year of 1949 the number of newly affected families each week rose sharply to a peak in the 32d week ending August 12, and then declined slowly (fig. 1). However, the percentage of those developing more than one case followed a horizontal trend which was elevated only at the onset of the outbreak, then dropped to a level maintained for 20 weeks until the end of the epidemic period. Consequently, while a rise and fall in the number of affected families was occurring, the percentage of those developing more than one case remained fairly constant during the epidemic except at onset when the percentage was unduly elevated.

The results observed in the endemic years from 1950 through 1952 are given in figure 2 in terms of an annual average for the 3-year period. That is, the data from the corresponding weeks of each year were combined, as shown in the table, and the average value for each week was used as representative of the period.

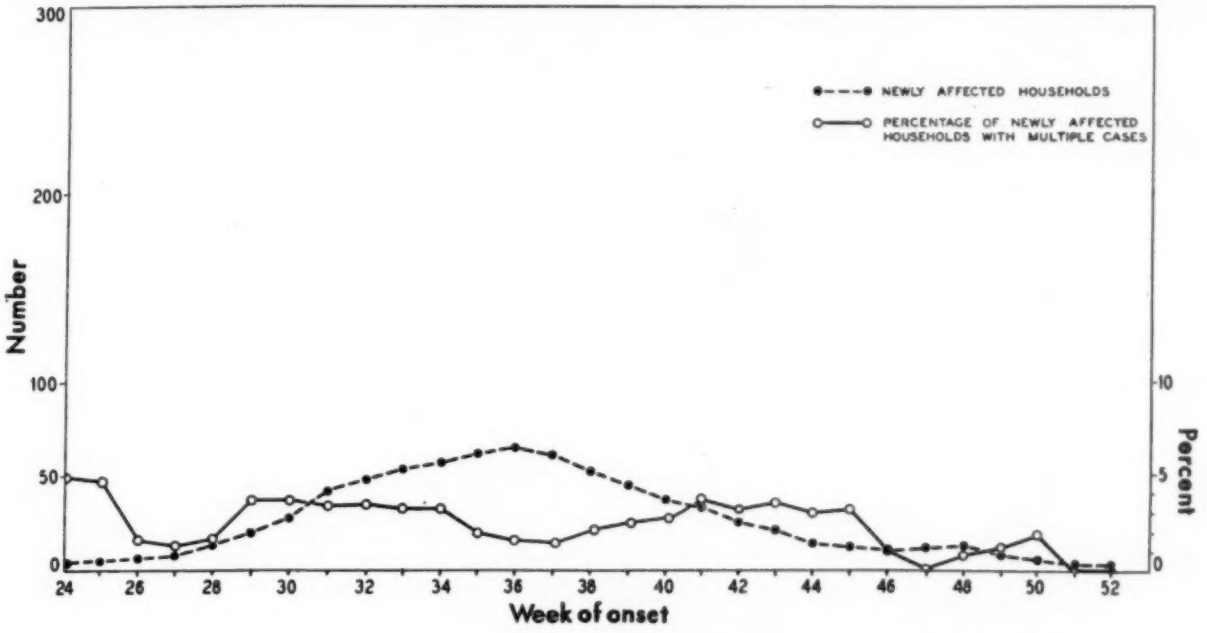
Poliomyelitis cases in newly affected households and percentage of newly affected households with multiple cases by week of onset in 1949 and in 1950–1952

Week of onset	1949			1950–1952		
	Newly affected households	Households with multiple cases		Newly affected households	Households with multiple cases	
		Number	Percent		Number	Percent
1–22	8	0	0.0	64	2	3.1
23	3	0	0.0	9	0	0.0
24	2	0	0.0	11	1	9.1
25	7	0	0.0	20	1	5.0
26	13	2	15.4	10	0	0.0
27	44	4	9.1	25	0	0.0
28	54	3	5.6	38	1	2.6
29	97	3	3.1	54	1	1.9
30	151	7	4.6	91	5	5.5
31	280	14	5.0	114	4	3.5
32	286	11	3.8	165	4	2.4
33	257	9	3.5	158	8	5.1
34	225	9	4.0	159	5	3.1
35	173	5	2.9	186	4	2.2
36	139	7	5.0	201	2	1.0
37	107	5	4.7	191	3	1.6
38	86	4	4.7	154	4	2.6
39	85	6	7.1	128	3	2.3
40	62	4	6.5	122	4	3.3
41	40	2	5.0	99	3	3.0
42	44	0	0.0	90	4	4.4
43	49	4	8.2	54	1	1.9
44	32	2	6.3	47	2	4.3
45	31	0	0.0	28	1	3.6
46	16	1	6.3	20	0	0.0
47	13	1	7.7	39	0	0.0
48	7	0	0.0	40	0	0.0
49	5	0	0.0	27	1	3.7
50	4	0	0.0	17	0	0.0
51	3	0	0.0	3	0	0.0
52	3	0	0.0	6	0	0.0
Unknown	12	0	0.0	0	0	0.0
Total	2,338	103	4.4	2,370	64	2.7

In the endemic years, a slowly progressive rise and decline in the number of newly affected families occurred during the summer and fall, and the percentage of households with multiple cases followed a horizontal trend. The number of new cases did not rise to the high levels observed in the 1949 epidemic, and the percentages of affected families with multiple cases were consistently lower than in 1949. It is further to be noted that the poliomyelitis season was again ushered in by a rise in the frequency of multiple cases above average levels as had been observed in 1949.

Thus, the percentage of households with multiple cases appears to be fairly constant during the so-called poliomyelitis season, being higher in epidemic years than in nonepidemic years. In both periods, the percentages were somewhat elevated above their respective mean values at the onset of the poliomyelitis season.

Figure 2. Average annual cases of poliomyelitis in newly affected households and percentage of newly affected households with multiple cases by week of onset (3-week moving average), New York City, 1950–52.



Discussion

This study of the seasonal trend of multiple household cases of poliomyelitis has revealed some interesting features of theoretical and practical importance. The frequency of multiple clinical infections for a given year, expressed as a percentage of households with more than one case of poliomyelitis, was established early in the poliomyelitis season and was continued at a fairly constant level throughout the year regardless of seasonal fluctuation in incidence. From this standpoint, therefore, there was no evidence of a basic alteration in host-agent parasitism in the course of the seasonal rise and fall in number of reported cases. The data suggest that virulence as measured by the capacity to induce clinical infection among household contacts was not altered by serial passage in the human host under the natural conditions that prevailed during the study.

Several points of practical importance follow as a consequence of the foregoing observations. First, there was no evidence of an alteration in epidemic pattern arising from the control measures generally employed at the time. Otherwise there should have been a reduction in the percentage of households with multiple cases.

Second, the percentage of affected households with multiple cases could serve as a useful index for measuring the efficacy of a prophylactic agent, particularly when used during one part of an epidemic or in the absence of satisfactory controls. A favorable prophylactic effect should result in a measurable reduction in the percentage of household contacts developing clinical infection.

The increase in the percentage of multiple cases in the epidemic year of 1949 as compared with the 3 endemic years that followed was observed at the onset of the poliomyelitis season and continued throughout the summer. Such an increase might be used as an early index of epidemicity. However, our experience is limited to 1 epidemic and 3 nonepidemic years. If confirmed in other studies, its value in forecasting an impending epidemic should be further explored in conjunction with other methods thought to have predictive value (*9*). The practical value of the method might be limited because of the low frequency of multiple cases to large population groups or to areas of inordinately high attack rates (*10*).

The increase in the percentage of multiple household cases observed at the onset of the poliomyelitis season in epidemic and endemic

years may be apparent only. It may represent merely a variation due to small numbers or may be due to underreporting of cases in the general population. Selective reporting of families with multiple cases might be expected, particularly at the onset of the poliomyelitis season when the population has not yet been overly alerted, and would carry more weight in calculating percentages at that time when the total number of reported cases is low than later on when the totals are high. Unusual factors affecting the host and his environment were considered but could not be related to the change. Obviously, additional data are needed before its full significance can be properly evaluated.

Summary

1. The seasonal trend of the percentage of households with multiple cases of poliomyelitis was studied in New York City from 1949 to 1952, inclusive.

2. The percentage of affected families with more than one case of poliomyelitis for a given year was maintained at a fairly constant level throughout the poliomyelitis period despite the seasonal fluctuation in incidence, but was consistently higher in the epidemic year of 1949 than in the ensuing endemic years. This difference between epidemic and endemic years was discernible from the very onset of the poliomyelitis season.

REFERENCES

(*1*) Francis T., Jr.: Distribution of virus in the epidemic community. Tr. A. Am. Physicians 65: 176–183 (1952).

(*2*) Aycock, W. L.: Familial aggregation in poliomyelitis. Am. J. Med. Sc. 203: 452–465 (1942).

(*3*) Siegel M., Greenberg, M., Magee, C. M.: Tonsillectomy and poliomyelitis. I. Studies on incidence in 1949. II. Frequency of bulbar paralysis, 1944–1949. J. Pediat. 38: 537–547, 548–558 (1951).

(*4*) Zintek, A. R.: Rapid infection of family after introduction of poliomyelitis virus. Am. J. Hyg. 46: 248–253 (1947).

(*5*) Wenner, H. A., and Tanner, W. A.: Widespread distribution of poliomyelitis in household attacked by the disease. Proc. Soc. Exper. Biol. & Med. 66: 92–94 (1947).

(*6*) Brown, G. C., Francis, T., Jr., and Ainslie, J.: Studies of the distribution of poliomyelitis virus V. The virus in familial associates of cases. J. Exper. Med. 87: 21–27 (1948).

(*7*) Aycock, W. L., and Eaton, P.: A comparison between multiple cases of measles, scarlet fever and infantile paralysis. Am. J. Hyg. 5: 733–741 (1925).

(*8*) Siegel, M., and Greenberg, M.: Passive immunization in relation to multiple cases of poliomyelitis in the household. Epidemiologic aspects in New York City, 1949–1952. New England J. Med. 249: 171–177 (1953).

(*9*) Hemphill, F. M.: Methods of predicting total cases of poliomyelitis during epidemic years. Am. J. Pub. Health 42: 947–955 (1952).

(*10*) Adamson, J. D., Moody, J. P., Peart, A. F. W., Smillie, R. A., Wilt, J. C., and Wood, W. J.: Poliomyelitis in the Arctic. Canad. M. A. J. 61: 339–348 (1949).

Medical Practitioner Committee on Gamma Globulin

The Public Health Service has named a committee of seven practitioners of medicine to advise concerning the practical problems faced by the practicing physician in connection with the program of allocating gamma globulin for poliomyelitis. The group has been asked to interpret the allocation program through medical organizational channels so as to prevent misunderstanding, to evaluate the acceptability of the distribution plan, and to suggest desirable changes.

The committee held its first meeting in Washington September 10. Members are: Dr. Woodruff L. Crawford, Rockford Ill.; Dr. Edward E. Haddock, Richmond, Va.; Dr. Aims C. McGuinness of the School of Medicine, University of Pennsylvania; Dr. Herbert P. Ramsey, Washington, D. C.; Dr. A. M. Townsend, St. Louis, Mo.; Dr. Frank Wilson, director of the Washington Office of the American Medical Association; and Dr. Samuel M. Wishick of the Graduate School of Public Health, University of Pittsburgh.

National Evaluation Of Gamma Globulin

With the primary objective of measuring the effectiveness of gamma globulin in reducing the severity of paralysis in cases of poliomyelitis, a temporary National Gamma Globulin Evaluation Center has been set up within the Communicable Disease Center of the Public Health Service at Atlanta. The national evaluation center is also concerned with evaluating administrative and other phases of the national gamma globulin program. It does not distribute or administer the blood derivative Dr. Abraham M. Lilienfeld, assistant professor of epidemiology at the Johns Hopkins University School of Hygiene and Public Health, is director of the national center.

Households where two or more cases of the disease occur are being chosen for special study, and all cases in selected epidemic areas will be investigated. Although it will be impossible to study all expected multiple case households in all States, as large a proportion as possible will be surveyed. Epidemic intelligence service officers, nurse-epidemiologists, and statisticians from the Communicable Disease Center have been assigned to the special studies. The study of multiple case households is already under way on a national basis. Epidemiological investigations in collaboration with State health departments have already been started in Alabama, Kentucky, North Carolina, Tennessee, and Virginia.

An advisory committee of 17 leading poliomyelitis authorities planned the investigation and will report on its progress. The committee is headed by Dr. Alexander D. Langmuir, chief epidemiologist of the Communicable Disease Center, which is responsible for coordinating the national evaluation. Ten local and State health departments are represented on the committee.

Other members of the committee are Dr. John Chapman, epidemiologist, Los Angeles City Health Department; Dr. Roy F. Feemster, director, division of communicable diseases, Massachusetts Department of Public Health; Dr. D. G. Gill, State health officer, Alabama Department of Public Health; Dr. A. L. Gray, director of preventable disease control, Mississippi State Board of Health; Dr. Morris Greenberg, epidemiologist, New York City Health Department; Dr. Arthur C. Hollister, Jr., chief, bureau of acute communicable disease control, California Department of Public Health; Dr. Robert F. Korns, director, bureau of epidemiology and communicable disease control, New York State Department of Health; Dr. John D. Porterfield, director of health, Ohio Department of Health; Dr. Leonard M. Schuman, deputy director for division of preventive medicine, Illinois Department of Public Health; and Dr. Thomas F. Sellers, State health officer, Georgia Department of Public Health.

Also: Miss Lucy Blair, consultant, professional services, American Physical Therapy Association; Dr. Thomas Francis, Jr., professor of epidemiology, University of Michigan School of Public Health; Dr. William McD. Hammon, professor of epidemiology, University of Pittsburgh School of Public Health; Dr. John R. Paul, professor of preventive medicine, Yale University School of Medicine; Dr. Albert B. Sabin, director, Children's Hospital Research Foundation, Cincinnati; and Dr. Jessie Wright, medical director, D. T. Watson School of Physiatrics, Pittsburgh.

Arrangements for a muscle examination by a physical therapist of each case 50 to 70 days following onset of illness have been made with the American Physical Therapy Association, aided by a grant from the National Foundation for Infantile Paralysis. The gamma globulin is being made available by the Foundation and by the American Red Cross.

The program is sponsored by the Public Health Service in collaboration with the Association of State and Territorial Health Officers, the American Physical Therapy Association, and the D. T. Watson School of Physiatrics, which is affiliated with the University of Pittsburgh School of Medicine.

Based on material prepared by the National Gamma Globulin Evaluation Center, Communicable Disease Center, Public Health Service, Atlanta.

Organization and Administration of Bilateral Public Health Programs in Latin America

From the basic agreements which inaugurated the inter-American efforts, the evaluators traced the development of the Servicio concept and outlined its administrative characteristics. These efforts, they report, have been "directed toward developing in each country a health program best fitted to the needs of the particular country, staffed with well-trained nationals, and for which that country could eventually assume complete economic and technical responsibility."

THE RESOLUTION adopted by the foreign ministers of the 21 American Republics at their meeting in Rio de Janeiro in January 1942 recommended to the governments represented that individually or through bilateral or multilateral agreements the necessary means be taken to solve the environmental sanitation and health problems of the Americas, and that to this end each country, according to capacity, contribute raw materials, services, and funds.

Thus, it was recognized that no one nation, regardless of how favorable its economic position, could be expected to bring about any appreciable change in the health conditions of the other nations by the provision of money alone. It was also recognized that the desired objectives could not be reached by any attempt by one nation to take over and run the health services of another.

The approach to the health and sanitation problems in Latin America, therefore, was to establish a program of assistance through cooperative efforts directed toward the strengthening of the existing health services of each country. This would require expansion of services and, in some cases, creation or complete rebuilding of services. All efforts of the cooperative program, therefore, have been directed toward developing in each country a health program best fitted to the needs of the particular country, staffed with well-trained nationals, and for which that country could eventually assume complete economic and technical responsibility.

Bilateral Agreements

The cooperative health and sanitation programs in each country have been inaugurated and developed through bilateral agreements. Out of the initial agreements between the

This paper and the one following are the fourth and fifth in a series of excerpts from the report of the Public Health Service's evaluation survey of 10 years of operation of the Institute of Inter-American Affairs bilateral health programs in Latin America. Introductory notes concerning the objectives and limitations of the survey, a brief summary of the history of these programs, a résumé of the criteria and methods used in evaluating them, and a discussion of the cultural problems encountered were presented in the September issue of Public Health Reports, pp. 829–857.

United States and Ecuador and the United States and Brazil in 1942, there evolved a pattern which generally came to be followed in all countries. Common to all programs were what came to be known as (*a*) the basic agreement, (*b*) the project agreement, and (*c*) the completion agreement. A summary of the chief features of these agreements follows.

Basic Agreements

The cooperative programs are initiated and extended by an exchange of notes between the United States ambassador and the foreign minister of the country involved which indicate the willingness of the respective governments to participate in a cooperative health and sanitation program. The notes authorize the minister of health and the representative of the Institute to draw up and sign an agreement stipulating the basic financial contributions and technical assistance to be contributed by each government and the general conditions under which the program will be carried out. This agreement, known as the basic agreement, is the contract between the two countries for the conduct of the cooperative program.

These agreements have taken two general forms: (*a*) An exchange of letters between an official of the Institute and the minister of health of the Latin American country, in which these two officials signify their agreement upon certain criteria as a basis for operating the cooperative program; or (*b*) a formal document drawn up and signed by the minister of health or his representative and a representative of the Institute. The latter technique came into general usage after a few years.

The provisions of the basic agreements, though varying in detail from country to country, have followed the same general pattern. The major provisions common to most agreements are as follows:

1. Provides for the establishment of a special unit of government in the host country to carry out the cooperative program. In Spanish-speaking countries this unit is usually designated as *Servicio Corporativo Interamericano de Salud Pública*, or *SCISP*. In nations where French or Portuguese is spoken, the designation is in the language of the country. The word "*Servicio*," however, has become largely universal in usage.

2. Provides for sending to the host country a small group of United States technicians, called a field party, under the direction of a chief of field party. Most of the early agreements provided that the chief of party should be a doctor of medicine, but that provision has generally been eliminated.

3. Provides that the chief of field party will be the director of the *Servicio*.

4. Specifies the amount of money to be contributed to the cooperative program by each government and the period of time covered by the agreement.

5. Defines in some detail the area in which the program is to function, and specifies that the program is to be carried out on the basis of specific projects agreed upon in writing by the director of the *Servicio* and the minister of health or his representative.

6. Provides that the salaries and traveling expenses of the members of the field party will be paid directly by the Institute.

7. Defines the administrative authority of the director of the *Servicio* with regard to the employment of personnel, the expenditure of funds, and the accounting and reporting processes.

Thus, from the very beginning of the program in each country there has been a defined base of operation agreed to in writing by both parties. This has undoubtedly prevented many operational problems from arising and contributed immeasurably to the stability of the various programs.

The original agreements were usually brief, and some of the provisions were phrased in very general terms. As experience dictated, the agreements became more specific. In the beginning, they usually covered a period of 2 or 3 years, but after the war they were extended on a year-to-year basis. This made program planning and administration difficult, particularly since most Latin American countries operate fiscally on a calendar year and the United States appropriations usually come through long after the July 1 beginning of its fiscal year.

In 1949, Congress extended the life of the Institute to 1955, and it was possible to extend

the basic agreements for a 5-year period. The extensions covered all basic provisions except the amount of money to be contributed by the respective governments. Since this amount depends upon the appropriating bodies of the respective governments, it is necessary to amend the agreements yearly to indicate the respective contributions.

The model proposed by the Institute to be used as a basis for negotiating the 5-year extensions contained a significant statement of objectives:

"To promote and strengthen friendship and understanding between the peoples of the Republic of _____ and the United States of America and to further their general welfare;

"To facilitate public health and sanitation activities in _____ through cooperative action on the part of the parties to this agreement; and

"To stimulate and increase the interchange between the two countries of knowledge, skills and techniques in the field of public health and sanitation."

Project Agreements

The programs of the *Servicios* are carried out, for the most part, in the form of individual projects. When a particular activity is agreed upon, such as the construction of a water supply system for a village or a malaria control program for the entire country, a written plan called a project agreement is drawn up and signed by the minister or his representative and the chief of field party. This agreement defines the work to be done and allocates the necessary funds. If, because of unanticipated factors or errors of judgment, the cost of the project exceeds the original estimate, additional funds may be allocated in the same manner. The director of the *Servicio* usually has the authority to make the actual disbursement of funds within the provisions of the project agreements.

The first project to be agreed upon and signed by the respective officials in each country is known as the administrative project. It provides the funds for the establishment of the *Servicio* as a unit of government. The various administrative projects are periodically amended to provide administrative funds for continued operation and are usually terminated only when the cooperative program is terminated.

The administrative project for Ecuador is typical. It provides funds for the salaries and traveling expenses of administrative personnel (exclusive of the United States field party), purchase of office supplies, communication expenses, purchase and repair of office furniture and equipment, rent for offices and storerooms, and other items of a general administrative nature.

Completion Agreements

As the name implies, the completion agreement is a document indicating the completion of a project. In this agreement, the minister and the chief of field party, who draw up and sign the document, agree that the work outlined in the project agreement has been completed and that the project is ready to be turned over to the appropriate governmental agency for continued operation. In many of the activities dealing with the training of personnel and perhaps the operation of certain facilities, it is impossible to draw a hard and fast line to indicate the point at which the project is finished.

The completion agreements are designed to provide a complete record of program accomplishments. Whereas the project agreement indicates the goals and plans for an undertaking, the completion agreement indicates exactly what was accomplished. These agreements, if properly maintained, provide a record of problems encountered in the course of the project operation, the techniques used to meet these problems, and the degree of success attained. The completion agreements become a history of the project and are of great value to the *Servicio* personnel in evaluating their own performance and in planning future undertakings. Likewise, they are of considerable value to the agency taking over the responsibility for the future operation of the project. Descriptions of methods which failed, as well as those which succeeded, should be recorded in these agreements to assist in future operations.

The completion agreements also provide a record of the actual expenditures made under the project agreements and any amendments. In addition to the amounts specified in the project agreements, they record any contributions made by third parties, such as municipalities,

states, private individuals, or private agencies. Such contributions may be in cash or in land, buildings, or personal services. The agreements further provide for the disposition of all property, equipment, or materials used in the development of the project.

Special Projects

An important part of the cooperative program consists of special projects which are financed completely from Institute funds and administered directly by the Institute. Special projects have been utilized in instances in which a worthy undertaking did not lend itself to bilateral action.

One of the major purposes of these projects has been the provision of scholarships and grants to Latin Americans for travel and study in the United States. Other special projects have included the translation of technical articles and books into Spanish; the furnishing of books to medical schools in Latin America; the purchase of blood plasma and its shipment to Guatemala for treatment of casualties during a revolution; the sending of sulfadiazine to Chile during an epidemic of meningitis; and the furnishing of advisory service to the Colombian Government in reorganization of the ministry of health.

Financial Contributions

The percentage of funds contributed by the United States to the cooperative health programs has varied considerably in the different countries, reflecting to some extent the economic level of the country. For example, in Venezuela the 1951 basic agreement called for a contribution of $25,000 by the Institute and a contribution of $502,500 by the Venezuelan Government to the basic program funds of the *Servicio*. However, the *Servicio* had a working arrangement with the Ministry whereby 75 percent of the cost of constructing water supply systems was paid by the government of the Venezuelan State in which a particular project was located. The *Servicio* contributed the other 25 percent. Therefore, on this basis the United States contributed roughly 2 percent and Venezuela contributed 98 percent of the funds. The cost of the technical assistance supplied by the United States, however, approximated $115,000, raising the United States contribution to approximately 8 percent and lowering Venezuela's to 92 percent.

In countries having a less favorable economic position than Venezuela, the percentage contributed by the United States has generally been much greater. For example, in Haiti, the United States contribution in money in 1951 was $84,000 and the basic Haitian contribution was $255,000, a ratio of 25 percent by the United States to 75 percent by Haiti. The cost to the United States for technical staff, however, was $87,000; therefore, the United States furnished about 41 percent of the total cost of the *Servicio's* operations.

Technical Contributions

During the first years of the program, the United States contributed a high percentage of the technical and administrative knowledge and skill that went into the *Servicio* operations. The group of United States technicians, known as the field party, however, has usually numbered less than 10 people in each country. In addition to the chief of field party, who is either a physician or an engineer, the field party may include one or more of the following, depending upon program requirements: nurses, physicians, engineers, health educators, hospital administrators, industrial hygienists, and laboratory technicians. Each field party also includes a business manager, who has the responsibility for the business administrative functions of the field party and usually of the *Servicio*.

As Latin Americans acquired training and experience in the operation of the programs, the contributions of the various Latin American countries in technical skills greatly increased. On June 30, 1951, there were in all countries about 110 United States technicians in the health *Servicios* in comparison to 7,100 Latin Americans.

Third-Party Contributions

Through June 30, 1951, third-party contributions amounting to almost $10 million had

been made to the cooperative health program. Most of these funds were contributed by local governments and local citizens groups as an inducement to secure *Servicio* assistance in some local project, such as a water supply or sewerage system, or a hospital or health center. As previously mentioned, the *Servicio* in Venezuela would not, by policy, undertake a project until a State, acting as a third party to a special project, should commit itself to contribute two-thirds of the funds.

In addition to the $10 million contributed in funds, a conservatively estimated $6.5 million contribution in other than cash has been made by third parties. Lack of uniformity in the reporting process among the various *Servicios* and the variety of forms which third-party contributions take make for difficulty in obtaining an accurate estimate. For example, in the construction of water supply systems in Honduras, villagers contributed their own labor to dig ditches and carried water pipe by burro. When the trails ended, they carried the pipe on their own backs over a range of mountains.

The value derived from third-party contributions is, of course, far greater than any monetary approximation would indicate. It has been well demonstrated in many countries that the monetary contributions are manifestations of the interest of the community in a project. Experience has shown that where the people of a community have had an active part in the planning, financing, and development of a facility, the chances for its continued operation at a satisfactory level of efficiency are much greater than where the people have not taken an active part.

Unfortunately, facilities have been developed by *Servicios*, perhaps upon a valid basis of need, but without sufficient attention to community understanding, encouragement of community participation, and careful evaluation of community economic status as related to financial ability necessary for maintenance.

The Servicio

The *Servicio* has come to be the trade-mark of the Institute of Inter-American Affairs. It is the administrative framework within which the two countries which are parties to a bilateral agreement pool a portion of their economic and technical resources in order, in the case of health, to raise the health level of the host nation and promote, develop, and perpetuate a sound health program.

In most countries, the health *Servicio* is set up as a major operating division of the ministry of health. The director of the *Servicio* is on the same executive level as the directors of the other major divisions of the ministry, and organizational charts show the director of the *Servicio* reporting directly to the minister. The only exception to this pattern is in Chile, where the *Servicio* is within the National Health Service, and the administrative line runs from the director of the *Servicio* to the Director General of Health and then to the Minister of Health.

Field Party Members

Members of the field party occupy key positions in the *Servicio's* administrative structure. In all countries except Brazil, the chief of field party is the director of the *Servicio*. In some countries, other members of the field party hold administrative positions within the *Servicio* and are given official recognition by appointment by the national government; in others, by designation of the director of the *Servicio*. Although there has been no uniform definition of their administrative responsibilities with relation to the *Servicio's* national employees, the influence of the field party members on administration does not appear to have been greatly lessened by this lack.

The chief of field party as director of the *Servicio* generally has a dual administrative responsibility. As chief of field party, he is responsible for the supervision of Institute personnel in the field and for the Institute's participation in the cooperative program. As such, he is on equal footing with the minister of health in negotiating basic agreements and in determining the program to be followed by the *Servicio*. However, the chief of field party as director of the *Servicio* is subject to the administrative direction of the minister, at least theoretically, since the *Servicio* is a part of the ministry. There is a considerable variation from country to country as to how much administrative direction is given by the minister, but

in most countries it appears that the chief of field party has exercised very wide latitude in determining program content and in supervising its execution.

In Chile, the field party members, with the exception of the chief of field party, hold official positions within the *Servicio* but are designated as consultants to a national counterpart. The relative influence exerted by the different members of the field party on the administration of the program appear to depend much more on the individual's capabilities than on his official designation.

In Brazil, a national replaced the chief of field party as administrative head of the *Servicio* after the program had been in operation 2 years. The chief of field party, as the United States representative, continued to approve all expenditure of *Servicio* funds and served in an advisory capacity to the Brazilian director. As local counterparts of other members of the field party were trained to the point where they could assume the responsibility for direct program administration, the other United States technicians in Brazil also stepped aside and became consultants.

In some countries there would seem to be little justification for not training local personnel and transferring operational responsibility to them in a relatively short time. In others, because of such factors as frequent changes in government, general economic and political instability, and a scarcity of trained personnel, the process necessarily must be much slower. Every effort should be made in all countries to train local counterparts of the United States technicians, even though it may not be practicable to turn over complete administrative responsibility for some time.

Relationship to Other Ministries

Although the *Servicio* is an administrative unit of the ministry of health, some members of the field party are engaged in work as consultants to, or are closely associated with, another ministry or unit of government other than the ministry of health. For example, it is not unusual for a nurse consultant assigned to the field party to have as her primary assignment work with a school of nursing located in the ministry of education or some other branch of government.

The *Servicio* may not only conduct a major program which involves working closely with another ministry, but it may actually be performing activities which would normally be performed by another ministry. For example, in Ecuador the *Servicio* has engaged in a large program of building water supply and sewage systems, an activity which would normally be performed by the ministry of public works. The *Servicio's* activities in that field have necessarily been closely coordinated with that ministry's activities.

It has become clear that the *Servicio* should be administratively attached to that ministry of government having the major responsibility for the field of activity for which the *Servicio* is established. In establishing *Servicios* in the field of health and sanitation in Latin America, the choice of ministries is fairly obvious, since most ministries of health have the major responsibility for public health and a substantial responsibility for hospital and institutional care. It is not unusual, however, to find education, welfare, health, and other functions in the same ministry. The *Ministerio de Previsión Social* of Ecuador, for example, has responsibility for public health, the federally administered hospitals, welfare, labor, and firefighting services.

It is of paramount importance that all activities of the *Servicio* be carried out in close collaboration with that unit of the national government which has the responsibility for the specific function or which will be expected to assume such responsibility at the time the *Servicio* can turn it over for local administration.

Principles of Administration

As there are great differences in the size and type of programs in the various countries, it is to be expected that organizational differences should exist. Even so, the various programs illustrate extremes both of well-organized operations with defined administrative lines of authority and responsibility and of poorly organized operations without clearly defined lines of authority and responsibility.

Proper supervision within a field party and

within a *Servicio* can be achieved only when the organizational structure is so defined that all employees have a clear understanding of their responsibility and authority, including their administrative "chain of command." It is extremely important that the chief of party give impartial and adequate supervision and consultation to Institute and national personnel responsible for each type of activity. It is also important that the members of the field party keep the chief informed of developments in their programs, particularly if these developments are likely to have implications which would affect the total *Servicio* program.

The Servicio as an Administrative Device

EVALUATION of the *Servicio* as an administrative device for implementing the cooperative health and sanitation programs in Latin America necessarily took into account both the advantages and the disadvanges of this arrangement. No contention was made, however, that other administrative arrangements might not have served as well.

The characteristics of the *Servicio* considered advantageous include its continuous existence, its official status as an administrative unit of the host government, its large amount of freedom, from administrative controls of both the host government and the United States Government, and its stability. Thus, the *Servicio* provides an operational framework for technical assistance, facilitates the translation of plans into action, contributes to the training of nationals in technical skills, provides a base for indirect assistance to ministries other than the one in which it is established, and offers an opportunity for training nationals in general administration.

An Organizational Framework

Since the *Servicio* is an actual administrative unit of the host country, the technicians arriving from the United States have an established base of operations, with facilities for office space, clerical assistance, supplies, telephones, and related supplies and services. Of even greater importance is the fact that the *Servicios* have existed in most countries as a stable unit of government for 10 years, thus permitting the establishment and maintenance of lines of communication and contact between *Servicio* personnel and all other officials and offices of the host government.

A large body of knowledge exists within the *Servicio* personnel regarding the operations of the host government which may affect the work of the *Servicio*. Knowledge of local protocol and of the methods and channels to be followed for the most expeditious application of the technical skills represented in the field party is preserved, even though the personnel of the field party changes.

Official Status

Opportunity for accomplishment of objectives by the field party is greatly enhanced by the official status accorded the *Servicio*. Such status opens many doors and makes available many operational facilities which otherwise would not be, at least without time-consuming negotiations.

As an official part of the national ministry, the *Servicio*, under the direction of the chief of field party, is in a position to carry out an operational program. Thus, once the minister and the chief of field party have agreed upon a program, the skills of the technical personnel may be applied to demonstrations under controlled conditions. Operational decisions may

be made largely without regard to political considerations. With the administrative direction of the program under the direct control of the technical group, it is possible to avoid many costly, time-consuming, and faulty operational decisions which are inevitable if responsibility rests with an untrained or inexperienced administrator. This factor was important in all countries early in the program and is still of paramount importance in many countries.

Special Operational Facility

In the agreements between the United States and each Latin American country in which *Servicios* have been established, there are provisions which make it possible for the *Servicios* to operate in a preferential setting. The authority of the chief of party to approve projects and put them into operation without prior clearance with the Institute makes possible the rapid translation of plans into action. At the same time, the *Servicio* is largely freed from the administrative controls and "redtape" of both the host government and the United States Government.

In many Latin American governments, procurement procedures are extremely involved. It is usually necessary to prepare a series of documents in multiple copies and to have them approved by a host of officials. More often than not, this process requires the final signature of the minister in order to procure anything from a postage stamp to a shipload of construction supplies. Many of the procurement procedures of the United States Government are only slightly less involved. The *Servicios* are in large degree freed from such procedures by the provisions of the basic agreements. As a result, they are able to secure supplies and transform work plans into action with a promptness previously unknown to most governmental agencies.

Most basic agreements also give the *Servicios* a high degree of autonomy with regard to personnel practices, accounting and recordkeeping, and other administrative activities. Thus, the *Servicio* can adopt or demonstrate the advantages of practices of the host government in fields which are appropriate.

Continuous Operation

The fact that the *Servicio* was not conceived as a short term "study and report" type of operation has proved to be advantageous in several respects. Over a period of years, the technical personnel can develop a considerable body of knowledge regarding the peculiar health problems, as well as the broad socioeconomic and political characteristics, of the particular country to which they are assigned. Because of the continuous operation of the *Servicio* in most countries, there is no break in the acquisition of this important background knowledge, and newly assigned technical staff may be readily oriented.

In the archives of Latin American government at all levels, as in the United States, are many studies and reports, perhaps well conceived and presented, which contain recommendations never put into effect. There are, of course, many reasons why sound recommendations never reach the execution stage, such as lack of adequate appropriations, an uninitiated legislative body, or opposition of interests within or without the government. But one outstanding reason is that the persons to whom the recommendations are directed often do not know how to go about initiating the changes suggested. It seems fair to conclude, therefore, that a large part of the success and popularity of the *Servicio* has been due to the fact that in actual operation it has provided dramatic demonstrations and has developed impact programs instead of making recommendations and leaving them to inexperienced, and to a large extent untrained, officials to carry out.

Characteristics of a locality often require the adaptation of tried methods—physical, social, economic, or political. Too often the technician in a survey-and-report operation is unable to perceive the adaptations necessary, with the result that the entire report is jeopardized in the minds of the local persons to whom it is directed.

In contrast, the *Servicio* operation allows the technician to make his "report" in the form of an actual demonstration project, with regional characteristics taken into account and with the collaboration of the national officials. Thus, the technician may adapt his acquired skills

and knowledges as operations dictate and submit a "final report" in the form of an operating service. Moreover, the nationals who have participated in the planning and execution of such a project are familiar with the project's goals and with its technical operation.

Training of Nationals

An important part of any technical assistance program is the providing of scholarships and travel grants for study in foreign countries. The *Servicios* utilize this practice with a high degree of success. As part of the host government, the *Servicio* is in position to evaluate the qualifications of applicants for such training. Equally as important, *Servicio* personnel are in a position to appraise in advance the opportunities that the national, once trained, will have to utilize his training in the services of his country. The *Servicio* itself provides an operating program to which many trainees return for the first application of their newly acquired skills.

In addition to contributing to the formal training program, the *Servicio* provides an opportunity for inservice training of Latin Americans. For example, when *Servicios* were established in many countries, few if any Latin American sanitary engineers were available. The *Servicio*, therefore, employed civil engineers or persons with engineering training or experience. They were given work assignments under the supervision of the field party's sanitary engineers in the design and construction of water supply and sewerage systems and on malaria control and other public health engineering projects. Thus, they received specialized training during the course of their work. The *Servicio*, by the nature of its structure and function, makes this type of training an effective contribution to the cooperative program.

A Base for Indirect Assistance

Whether a *Servicio* program is carried out as a demonstration project or as an impact program, actual operations and administrative direction rests within the *Servicio*. Therefore, technicians serving in a consultative capacity to another ministry or unit of government may be assigned to the *Serivico* field party. By having the *Servicio* as a base of operations, such a consultant operates in a preferential setting as compared with the consultant having no previously established base of operation and lacking the official status of the *Servicio* personnel.

Since the *Servicio* functions as a part of the government of the host country and is closely associated with the operations of other branches of that government, the technicians of the *Servicio* are in a good position to judge where grants-in-aid may be made effectively. Certainly, it would appear that where the grant-in-aid is used in a technical assistance program, the guidance of on-the-spot field party personnel would be imperative.

The *Servicio*, by reason of its unusual freedom of action, is in a position to make studies and conduct research programs either as a part of its own program planning or as aid to other units of government. Such research has the advantage of intimate knowledge of the relevant factors within the country and of close cooperation between the *Servicio* and other governmental and private agencies in the country.

A Stable Base

The relative instability and frequent change of governments in some Latin American countries constitute a factor which has demanded serious consideration by both government and private industry in their relationships with these countries. The *Servicios* have proved to be a stable base of operations for the technical assistance program, subject to minimum effect by political change in the host country.

The written basic contract under which the *Servicio* operates, with its great prestige as an international agreement, has been honored without exception by all governments, whether they have come to power by election or otherwise. When there is a change in government or a change in the ministry of health, which in some countries is quite frequent, the previously agreed upon technical cooperation program continues until the new government or the new minister becomes sufficiently oriented

to plan new projects with the chief of field party. It is true that in some instances a new minister may change the emphasis of a program, but observation has led to the conclusion that changes in the chief of party have had more apparent effect upon changing the emphasis of the cooperative program than have changes in the host government. The popularity of the *Servicios*' programs have often led to the indorsement of their activities by all political factions, or at least to the elimination of their activities from discussion in political campaigns.

Training in General Administration

The opportunity which exists in the *Servicio* for the training of nationals in many aspects of general administration is one of the strong positive factors in favor of the type of administrative arrangement it represents.

Experience has clearly demonstrated that successful development of a health program cannot be accomplished by the development of skills in the field of medicine and engineering alone. Basic principles of general administration must be developed in any government before highly technical skills in such fields as health, education, or agriculture can attain the desired ends. The *Servicio* as an operating agency under the direction of, or greatly influenced by, the chief of field party offers an excellent base for demonstrating techniques in personnel administration, financial administration, procurement, and control of property, and orderly office management. Through the business manager and other members of the field party it should be possible to assist the ministries to improve their practices in these fields. This would go a long way toward assuring continued operation of *Servicio* programs at a reasonable level of competence after they are turned over to the ministries.

Problems of Responsible Administration

It is a generally recognized principle of administration that divided authority and responsibility for the operation of a program usually lead to confusion, irresponsibility, and failure to achieve the desired results. The cooperative program by its very nature implies that the ultimate responsibility and authority for it rest with two sovereign governments. This problem has been met primarily by the delegation of authority and responsibility for program planning and operation in each country to the chiefs of field party in that country. The host governments agreed to the designation of the chiefs of field party as the directors of the *Servicios*, and in practice they have delegated practically complete operational responsibility to them. Thus, the chief of field party of each *Servicio* may put a program into action when he obtains the concurrence of the minister of health on specific projects, so long as it falls within the general framework of the bilateral agreement. Although project agreements do not require prior approval by the Institute, they are reviewed by it for form and legal commitments which may be involved.

The mere delegation of authority to the chiefs of field party does not completely solve the problem of dual responsibility, although it has unquestionably done much to facilitate operations.

The chief of field party has considerable prestige in most of the Latin American countries. He is an official representative of the United States Government. In some cases his salary is higher than that of the highest paid national government official. He has a considerable budget at his disposal, with few of the checks and controls imposed upon other operating officials in either country. In some countries, because the *Servicio* has demonstrated comparatively high efficiency, it has been asked to assume the role of purchasing and importing agent for other sections of the host government. This activity requires the handling of considerable sums of money in addition to the *Servicio* funds and not subject to the same control and audit as are the *Servicio* funds.

All these factors make it clearly impractical for the Institute to delegate completely its responsibility for the *Servicio's* operations and necessitate a bifurcated administration by the two governments involved. They also emphasize the absolute necessity of having outstanding administrators as chiefs of field party.

Inherent in the administration of the *Ser-*

vicios is the danger that they will develop into governmental institutions interested in self-perpetuation and lose sight of the fact that their existence is solely for the purpose of assisting a national government in strengthening existing units of government or in developing new units, all of which are to be fitted eventually into a unified and harmonious national governmental operation in a particular field of endeavor. Since the *Servicio* operates in a preferential setting, it is much easier for it to develop and maintain specific health services at a high level of efficiency than it is for most units of a national government. Because of an understandable pride of accomplishment and a reluctance to see the developed services undergo any unfavorable change, there has been a tendency to continue the programs and facilities under the auspices of the *Servicio* for longer periods than would appear to be desirable.

. . .

In considering the advantages and disadvantages of the Servicio as an administrative device, the evaluators reached the conclusion that, although full use has not been made of its positive administrative potential, not many of the negative possibilities have materialized to an extent to cause serious concern regarding the technique. They agreed that over a period of years the Servicio has worked, and worked well, and that the programs undertaken through this type of organization have been unquestionably highly successful. They concurred in the view that certainly no other type of administrative organization has been as thoroughly tested over such a period of time and in such a setting and found to be so successful.

United Nations Day

October 24 has been designated as United Nations Day by Presidential proclamation.

President Eisenhower urged the citizens of the Nation to observe the day by "sending messages to friends, relatives, and associates in other member countries of the United Nations, by learning more about the United Nations and its members, and by expressing their confidence in the United Nations, their friendship for other peoples, and their faith in the ultimate triumph of peace and justice through the efforts of men of good will."

He also called upon "officials of the Federal, State, and local governments, the United States Committee for United Nations Day, representatives of civic, educational, and religious organizations, agencies of the press, radio, television, motion pictures, and other communications media, and all citizens to cooperate in appropriate observance of this day throughout the country."

The proclamation pointed out that the United Nations provides the peoples of the world with an organization through which international differences in the economic and political fields can be peacefully resolved; that the need for the United Nations is greater than ever before, and that its success depends on the extent to which its members give it support.

1952 Provisional Data Indicates Decline In Tuberculosis Mortality

In 1952 in the continental United States, there were an estimated 25,080 tuberculosis deaths, or 16.1 per 100,000 population, according to 10-percent sample tabulations by the National Office of Vital Statistics. State health department provisional tabulations are usually slightly lower and in 1952, as reported to the Division of Chronic Disease and Tuberculosis on the Annual Tuberculosis Report, give a total of 24,195 deaths, a rate of 15.5.

Prepared by the Division of Chronic Disease and Tuberculosis, Public Health Service.

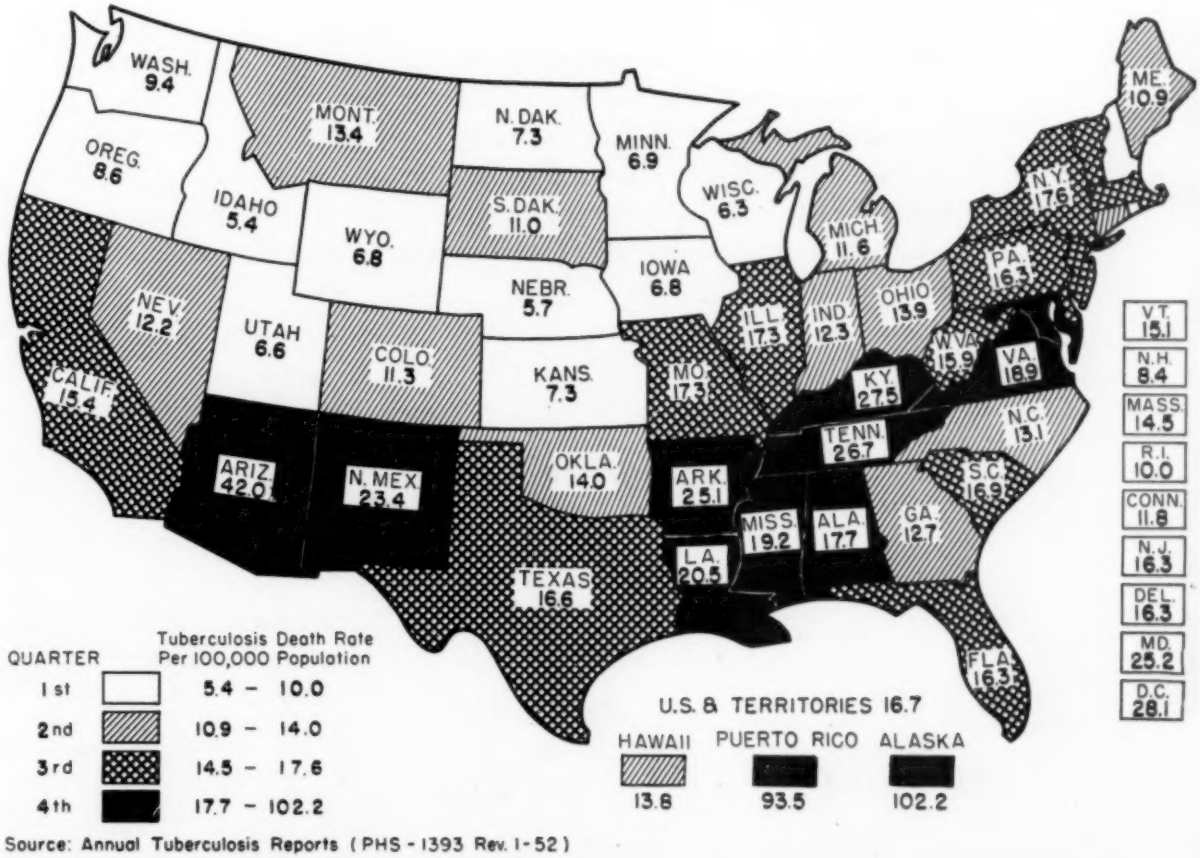
Thus, these two provisional figures, while not identical, are in agreement that there was a decline of approximately 30 percent in the tuberculosis death rate from 1950 to 1952.

Even though tuberculosis mortality is not by itself a realistic measure of the extent of the problem, it is still of general concern and serves to illustrate the progress made in an important aspect of tuberculosis control.

Twelve States had tuberculosis death rates in 1952 of less than 10, while 7 States, the District of Columbia, Puerto Rico, and Alaska had rates in excess of 20 (see map).

The cities with a population of 100,000 and over as a group had a provisional tuberculosis death rate of 22.4, or more than 70 percent higher than the death rate for the remainder of the country. (This does not include 6 States for which rates for their larger cities are not yet available.) Higher death rates in some of the States are partly due to the presence of highly urbanized areas.

Tuberculosis death rates in the United States and Territories, 1952, provisional data.



Source: Annual Tuberculosis Reports (PHS - 1393 Rev. 1-52)

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New York State, exclusive of cities of 100,000 population and over, has a tuberculosis death rate of only 10.7. Michigan, exclusive of the large cities, had a rate of 7.7, and Minnesota, exclusive of the large cities, had a rate of 5.1 per 100,000 population in 1952. However, even with the low rates which result when the cities over 100,000 population are removed from consideration, there were in the remainder of the continental United States in 1952 more than 13,000 tuberculosis deaths.

Tremendous progress has been made in the reduction of the tuberculosis death rate. It is hoped that within the next few years similar progress can be made in reducing the number of new tuberculosis cases.

To the Professional Public Health Worker

You, like the specialist in medical and other fields of science, know how important it is to be informed on current knowledge in your specialty. And, for the most part, you rely on the first-hand availability of the leading journals and periodicals in your specialty.

But as more becomes known of public health practice and research, the more complex this science becomes. There comes too the need to relate the activities of all its component disciplines—the members of the family of public health—one to the other, and each to the whole. And for each specialist there is a need to read regularly the journals devoted to unifying the family of public health. *Public Health Reports* is such a journal.

For Your Personal Copy of PHR

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Milk Sanitation Honor Roll for 1951–53

This compilation is from the Division of Sanitation of the Bureau of State Services, Public Health Service. The previous listing was published in Public Health Reports, April 1953, pp. 445–448. The rating method was described in Public Health Reports 53: 1386 (1938), Reprint No. 1970.

Seventy communities have been added to the Public Health Service milk sanitation "honor roll" and 42 communities on the previous list have been dropped. This revision covers the period from July 1, 1951, to June 30, 1953, and includes a total of 261 cities and 62 counties.

Communities on the "honor roll" have complied substantially with the various items of sanitation contained in the Milk Ordinance and Code recommended by the United States Public Health Service. The State milk sanitation authorities concerned report this compliance to the Public Health Service. The rating of 90 percent or more, which is necessary for inclusion on the list, is computed from the weighted average of the percentages of compliance. Separate lists are compiled for communities in which all market milk sold is pasteurized, and for those in which both raw milk and pasteurized milk is sold.

The recommended milk ordinance, on which the milk sanitation ratings are based, is now in effect through voluntary adoption in 400 counties and 1,558 municipalities. The ordinance also serves as the basis for the regulations of 34 States and 2 Territories. In 11 States and the 2 Territories it is in effect statewide.

The ratings do not represent a complete measure of safety, but they do indicate how closely a community's milk supply conforms with the standards for grade A milk as stated in the recommended ordinance. High-grade pasteurized milk is safer than high-grade raw milk because of the added protection of pasteurization. The second list, therefore, shows the percentage of pasteurized milk sold in a community which also permits the sale of raw milk.

Although semiannual publication of the list is intended to encourage communities operating under the recommended ordinance to attain and maintain a high level of enforcement of its provisions, no comparison is intended with communities operating under other milk ordinances. Some communities might be deserving of inclusion, but they cannot be listed because no arrangements have been made for determination of their ratings by the State milk sanitation authority concerned. In other cases, the ratings which were submitted have lapsed because they were more than 2 years old. Still other communities, some of which may have high-grade milk supplies, have indicated no desire for rating or inclusion on this list.

The rules for inclusion of a community on the "honor roll" are:

1. All ratings must be determined by the State milk sanitation authority in accordance with the Public Health Service rating method, which is based upon the grade A pasteurized milk and the grade A raw milk requirements of the Public Health Service milk ordinance. (A departure from the method described consists of computing the pasteurized milk rating by weighting the pasteurization plant rating twice that of the raw milk intended for pasteurization.)

2. No community will be included in the list unless both its pasteurized milk and its retail raw milk ratings are 90 percent or more. Communities in which only raw milk is sold will be included if the retail raw milk rating is 90 percent or more.

3. The rating used will be the latest submitted to the Public Health Service, but no rating will be used which is more than 2 years old. (In order to promote continuous rigid enforcement rather than occasional "clean-up campaigns," it is suggested that when the rating of a community on the list falls below 90 percent, no resurvey be made for at least 6 months. This will result in the removal of the community from the subsequent semiannual list.)

4. No community will be included on the list whose milk supply is not under an established program of official routine inspection and laboratory control provided by itself, the county, a milk control district, or the State. (In the absence of such an official program there can be no assurance that only milk from sources rating 90 percent or more will be used continuously.)

5. The Public Health Service will make occasional check surveys of cities for which ratings of 90 percent or more have been reported by the State. (If the check rating is less than 90 percent, but not less than 85, the city will be removed from the 90-percent list after 6 months unless a resurvey submitted by the State during this probationary period shows a rating of 90 percent or more. If the check rating is less than 85 percent, the city will be removed from the list immediately. If the check rating is 90 percent or more, the city will be retained on the list for 2 years from the date of the check survey, unless a subsequent rating during this period warrants its removal.)

Communities Awarded Milk Sanitation Ratings of 90 Percent or More, July 1951–June 1953

100 PERCENT OF MARKET MILK PASTEURIZED

Community	Date of rating
Alabama	
Auburn	9–19–1951
Birmingham-Jefferson County	7–26–1952
Gadsden-Etowah County	8– 8–1952
Montgomery	5–22–1952
Opelika	6–19–1952
Arkansas	
Fort Smith	10–18–1952
Colorado	
Denver City and County	11–27–1952
Grand Junction	4–25–1952
Pueblo	8–1951
Weld County	4–11–1952
Florida	
Pinellas County	1–29–1953
Georgia	
Albany	5–28–1953
Athens	4–16–1953
Atlanta	11–21–1951
Cairo	12–18–1952
Camilla	11–18–1952
Columbus	2–23–1953
La Grange	3–18–1953
Quitman	4– 9–1953
Savannah	8–15–1952
Tifton	6–18–1953
Valdosta	3–13–1952
Waycross	10–23–1951
Illinois	
Chicago	8– 1–1951
Indiana	
Bedford-Orleans	10–1952
Berne	3–1953
Bloomington	11–26–1952
Bluffton	3– 6–1953
Cooperative Grade A Milk Program	9–1952
Holland	
Huntingburg	
Jasper	
Crawfordsville	2–28–1953
Elkhart	11–1952
Indiana—Continued	
Evansville	10–1951
Fort Wayne	10–1952
Indianapolis	10–31–1952
Kokomo	2–11–1953
Madison	7–1952
Marion and Gas City	12–1952
Mount Vernon	1–16–1953
Muncie	1–28–1953
New Castle	2–1953
Peru	8–27–1952
Richmond	5–15–1953
Rushville	8–1951
Shelbyville	8–1952
South Bend	8–14–1951
Valparaiso	7–31–1952
Iowa	
Des Moines	7–1951
Dubuque	11–14–1952
Marshalltown	1–29–1953
Mason City	10– 3–1953
Kansas	
Dodge City	4–20–1953
Hillsboro	11– 7–1952
Kentucky	
Bowling Green	4–17–1952
Calloway County	2–15–1952
Campbell County-Newport	11–28–1951
Central City and Muhlenberg County	4– 1–1952
Christian County	12–20–1951
Fulton County	7–23–1952
Louisville and Jefferson County	5–23–1952
Owensboro and Daviess County	8– 6–1952
Owenton and Owen County	4– 2–1953
Pendleton County	4– 2–1953
Warren County	4–17–1952
Williamstown and Grant County	4– 2–1953
Louisiana	
New Orleans	12– 6–1951
St. Martin Parish	5–23–1952
Vermilion Parish	9– 9–1951
Mississippi	
Aberdeen	10–26–1951
Amory	10–25–1951
Belmont	7–12–1951
Booneville	9–28–1951
Brookhaven	3–11–1952
Canton	10– 1–1952
Clarksdale	9–25–1952
Cleveland	9– 3–1952
Columbia	7–17–1952
Columbus	8–13–1951
Eupora	3–28–1952
Greenville	8–25–1952
Greenwood	4–15–1952
Grenada	1–22–1952
Iuka	7–12–1951
Kosciusko	1–31–1952
Louisville	10– 4–1951
Macon	6–12–1952
McComb	10–25–1951
Meridian	6–18–1952
Morton	6–17–1952
Natchez	12–17–1952
New Albany	1– 7–1952
Ruleville	4–13–1952
Starkville	11–27–1951
State College	11–27–1951
Tupelo	4– 8–1953
Vicksburg	6–13–1952
Winona	1–24–1952
Missouri	
Cape Girardeau	3–15–1952
Jackson	3–15–1952
Kansas City	12–1952
Lebanon	2–13–1953
North Kansas City	12–1952
Springfield	2–13–1953
Warrensburg	12–1952
Nebraska	
Grand Island	9–18–1952
Nevada	
Yerington	12– 5–1951
North Carolina	
Alleghany County	9–10–1952
Charlotte	1–11–1952
Craven County	11–21–1952

Communities Awarded Milk Sanitation Ratings of 90 Percent or More, July 1951–June 1953—Con.

100 PERCENT OF MARKET MILK PASTEURIZED

Community	Date of rating
North Carolina—Continued	
Cumberland County	2–15–1952
Davie County	10– 1–1952
Durham County	7–18–1952
Edgecombe County (excluding Rocky Mount)	7–16–1952
Forsyth County	7–16–1952
Guilford County	8– 6–1952
Henderson County	2– 5–1952
Iredell County	10–25–1952
Jackson County	1–17–1952
Lincoln County	3–19–1952
Mars Hill	1– 4–1952
Mitchell County	8–10–1951
New Hanover County	6–10–1952
Orange County	7– 3–1952
Person County	3–17–1953
Pitt County	1–27–1953
Swain County	1–17–1952
Transylvania County	2– 5–1952
Yadkin County	10– 1–1952
Yancey County	8–10–1951
South Dakota	
Sioux Falls	10–25–1952
Vermillion	6–12–1952
Tennessee	
Athens	7–16–1952
Bristol	10–19–1951
Chattanooga	11–13–1952
Clarksville	1–30–1953
Cleveland	10– 1–1952
Clinton	11–28–1951
Columbia	5–22–1952
Cookeville	11–14–1951
Covington	10–22–1952
Cowan	10–17–1952
Dandridge	9–17–1951
Decherd	10–17–1952
Dyersburg	10–23–1952
Erwin	10–15–1951
Franklin	6– 6–1952
Greeneville	4–17–1952
Jefferson City	9–25–1951
Johnson City	8–27–1952
Tennessee—Continued	
Kingsport	10–23–1951
Knoxville	8–22–1951
Lebanon	8– 1 1952
Lewisburg	6–12–1952
Loudon	4– 3–1952
Manchester	10–17–1952
Morristown	9–25–1951
Nashville and Davidson County.	11– 5–1951
Newbern	10–23–1952
Newport	9–18–1951
Rogersville	4–21–1952
Shelbyville	6–11–1952
Sweetwater	9–16–1952
Tullahoma	10–17–1952
Winchester	10–17–1952
Texas	
Bryan	6–28–1952
College Station	6–28–1952
Commerce	9– 2–1952
Corpus Christi	9–27–1952
Corsicana	8– 6–1952
Dallas	1– 8–1953
El Paso	10–21–1952
Galveston	12–11–1951
Gladewater	7–26–1952
Harlingen	8– 4–1951
Houston	6–11–1952
Kerrville	7–31–1952
Kilgore	7–26–1952
La Feria	8– 2–1951
Lufkin	10– 8–1951
McKinney	2–17–1953
Mercedes	8–21–1951
Mineral Wells	2–11–1953
Mission	8–24–1951
Mt. Pleasant	9–24–1952
Nacogdoches	9–20–1952
Orange	1– 6–1952
Pharr	8–22–1951
Port Arthur	10–17–1951
San Antonio	11–20–1951
San Benito	8– 1–1951
San Juan	8–23–1951
Sweetwater	2– 4–1953
Texas—Continued	
Texarkana	7– 2–1952
Texas City	1–20–1953
Tyler	2–10–1953
Victoria	7–24–1952
Waxahachie	9–30–1952
Weslaco	8–24–1951
Wichita Falls	3–20–1953
Utah	
Logan	5–14–1952
Ogden	12–11–1951
Salt Lake City	4–29–1952
Virginia	
Abingdon	10–19–1951
Blacksburg	8– 7–1952
Bristol	10–19–1951
Front Royal	8–29–1951
Luray	8–29–1951
Narrows	8– 8–1952
Norfolk	9– 5–1952
Pearisburg	8– 8–1952
Pulaski	8– 7–1952
Radford	8– 7–1952
Richmond	5–21–1952
Roanoke	9–19–1952
Staunton	11– 7–1952
Suffolk	9–26–1952
Waynesboro	8– 3–1951
Washington	
Cowlitz County	10–12–1951
Spokane	9–25–1952
Whitman County	6–19–1952
Wisconsin	
Beaver Dam	2–27–1953
Burlington	3–26–1953
Delavan	3–26–1953
Eau Claire	3– 5–1953
Elkhorn	3–26–1953
Fontana	3–26–1953
Lake Geneva	3–26–1953
Madison	10– 5–1951
Ripon	2–27–1953
Waupun	2–27–1953
Williams Bay	3–26–1953

Communities Awarded Milk Sanitation Ratings of 90 Percent or More, July 1951–June 1953—Con.

BOTH RAW AND PASTEURIZED MARKET MILK

Community and percent of milk pasteurized	Date of rating
Alabama	
Clanton, 87.2	5–12–1952
Huntsville, 98	8–10–1951
Lanett, 97.8	11– 6–1952
Arkansas	
Little Rock, 99.3	4–20–1953
Florida	
Dade County, 99.99	1– 8–1953
Georgia	
Brunswick-Glynn County, 96	11– 6–1952
Carrollton, 94.2	3–14–1952
Cartersville, 97	12–11–1952
Cedartown, 98.3	3–11–1952
Gainesville-Hall County, 93.1	3–21–1952
Newnan, 94.7	6– 5–1952
Pelham, 88.8	11–18–1952
Thomaston, 81.7	4–30–1952
Winder, 97.9	1–23–1953
Indiana	
Michigan City, 98.1	7–1951
Kansas	
Pittsburg, 98	11– 7–1952
Kentucky	
Lexington and Fayette County, 97	4–28–1952
Princeton and Caldwell County, 94.7	6–1953
Somerset, 91	2–1953
Louisiana	
Iberia Parish, 94.4	6–1952
Shreveport, 99.9	8–1952
Mississippi	
Gulfport, 98	4–30–1952
Hattiesburg, 96	7–31–1952
Jackson, 98.6	9–11–1952
Laurel, 93.6	8–13–1852
West Point, 97.6	7–18–1951
Montana	
Missoula, 99.4	9–1952
North Carolina	
Ashe County, 78.7	9– 9–1952
Cabarrus County, 80.3	1–15–1952
Caldwell County, 88.7	10–29–1951
Halifax County, 83.4	4–10–1952
Kings Mountain, 83.8	8–18–1952
Lenoir County, 78.4	1–30–1953
Macon County, 91.5	11– 7–1952
Polk County, 87.5	6–18–1952
Robeson County, 96.6	2–15–1952
Shelby, 74.4	6– 6–1952
Wake County, 99.3	3– 4–1953
Wilkes County, 90.6	9–20–1951
Oklahoma	
Elk City, 99	4–17–1953
Stillwater, 98	4–29–1953
Oregon	
Salem, 99.7	7–15–1952
South Carolina	
Spartanburg and Spartanburg County, 91.3	10–31–1951
Tennessee	
Alcoa, 99.5	9–17–1952
Elizabethton, 93.6	11–25–1953
Harriman, 90.6	7–26–1951
Maryville, 99.5	9–17–1952
McMinnville, 95.3	5– 7–1952
Murfreesboro, 98.7	7– 6–1951
Ripley, 96.9	10–22–1952
Texas	
Austin, 97.3	10–24–1951
Beaumont, 99.9	8–15–1952
Brenham, 94.9	7–26–1951
Brownsville, 92.7	8– 1–1951
Childress, 87	2– 4–1953
Cleburne, 95.5	7–31–1952
Edinburg, 93.8	8–28–1951
Fort Worth, 99.97	2–12–1952
Gilmer, 94.4	1–29–1952
Greenville, 98	9–27–1952
Henderson, 94	1–31–1952
Laredo, 80	9–18–1952
Longview, 99.4	7–26–1952
Lubbock, 99	8–25–1952
Marshall, 87.2	10– 3–1952
McAllen, 99	8–22–1951
Palestine, 88.8	1–15–1952
Paris, 92.3	9–26–1951
Sherman, 93.3	11– 6–1951
Virginia	
Harrisonburg, 96	11–12–1952
Washington	
Tacoma, 99.7	8–13–1952
West Virginia	
Clay County, 88	9–16–1952
Kanawha County, 96	6– 6–1952
Nicholas County, 55	9–18–1952

NOTE: In these communities the pasteurized market milk shows a 90-percent or more compliance with the grade A pasteurized milk requirements, and the raw market milk shows a 90-percent or more compliance with the grade A raw milk requirements of the Milk Ordinance and Code recommended by the United States Public Health Service.

Note particularly the percentage of the milk pasteurized in the various communities listed. This percentage is an important factor to consider in estimating the safety of a city's milk supply. All milk should be pasteurized, either commercially or at home, before it is consumed.

publications

The Genera of the Homobasidiomycetes

U. S. Department of Agriculture, Division of Mycology and Disease Survey, Special Publication No. 3. 1953. By William Bridge Cooke. Limited edition, available on request to the Bureau of Plant Industry, Beltsville, Md. 100 pages.

This current listing of the genera of higher fungi gives 1,521 generic names of the polypores and overlapping groups and is intended as a reference for persons working with the higher fungi. Listed are the wood rotting fungi, such as dry rot; mushrooms and toadstools, including soil fungi and mycorrhiza formers whose fruit bodies may be poisonous or edible; and some plant pathogens. The compilation, arranged alphabetically, brings together for the first time widely scattered information found in private files, in technical publications, in published reviews, and in other relatively inaccessible places. The gastromycetes are not included in the compilation.

William Bridge Cooke is the compiler of the list. He is now a mycologist with the Environmental Health Center of the Public Health Service at Cincinnati and formerly a research associate in mycology at the State College of Washington, Pullman, Wash.

Individual Water Supply Systems

Public Health Service Publication No. 24. Revised 1950. Reissued 1953. 61 pages; illustrated. 25 cents.

Because of the accelerated rate of housing construction and the subsequently aggravated environmental health problems, especially in rural communities, the Joint Committee on Rural Sanitation has prepared these recommendations to establish a uniform approach for various Federal agencies concerned with the sanitation of individual water supplies.

Limited to the sanitation aspects of small water supplies used by one or possibly several families and by rural schools, recreational areas, and camps, the recommendations are applicable to newly developed supplies, alterations or extensions to existing supplies to eliminate sanitary defects, and maintenance of special vigilance on all questionable conditions until adequate corrections have been made.

The recommendations cover basic requirements, water-supply development of ground waters and surface waters, water purification, and pumping, distribution, and storage. Appendexes include recommended procedures for cement grouting of wells and for disinfection of wells. A bibliography on individual water supply systems is also given.

Typical Architectural Program for a General Hospital

Public Health Service Publication No. 322. 1953. 23 pages. A limited number of individual copies are available on request to the Division of Hospital Facilities, Public Health Service, Washington 25, D. C.

This publication is intended to serve as a guide in the development of architectural programs for the design and construction of hospital buildings. Such programs should be prepared through the cooperative efforts of the hospital board, administrator and staff, hospital consultant, and others concerned, and contain, in reasonable detail, the information which is vital to the architect before starting the drawings.

By presenting the type of information required in a usable format, this pamphlet will, it is hoped, stimulate the preparation of adequate architectural programs, the scarcity of which has proved to be a considerable handicap to good hospital planning.

Outpatient Departments For 50-, 100-, and 200-Bed General Hospitals

Public Health Service Publication No. 318. 1953. 14 pages; illustrated. Available on request to the Division of Hospital Facilities, Public Health Service, Washington 25, D. C.

This brochure is a compilation of material from Elements of the General Hospital and other publications of the Division of Hospital Facilities. It is intended to serve as a ready reference until more detailed studies relating to outpatient facilities are completed.

The brochure describes the requirements and functional design relationships of the various component sections of the outpatient department of the 50-, 100-, and 200-bed general hospital. Floor plans and discussion regarding waiting-room areas, information, appointment, medical records, social service, examination and treatment rooms, drug dispensary, and a dental suite are presented.

The Child With a Cleft Palate

Children's Bureau Folder No. 37. 1953. 13 pages; illustrated. 10 cents.

One baby in every 1,000 is born with a cleft palate. That baby now has a better chance of overcoming this handicap than has been true in the past because of increased understanding of the problem and better means and increased skill in the treatment of the cleft palate.

This Children's Bureau publication, another in a series of pamphlets designed to help parents who have a child with a handicapping condition, outlines different ways of

publications

treating cleft palate, tells what special care is needed, underlines the importance of early speech training, and tells where parents can go for help in their community.

Emphasis is placed on the fact that cleft palate is not a hopeless handicap and that thousands of men and women born with a cleft palate have become business leaders or hold responsible, well-paying professional jobs. With understanding and proper guidance any child with a cleft palate has every chance to develop into a useful, happy, and successful adult.

Health Status and Services, January 1952. Economic Base Study, Arkansas-White-Red River Basins

Public Health Service Publication No. 313. Health, Housing, Education and Recreation Series, part VI, section 1. 1953. By Rollo H. Britten and Maryland Y. Pennell. 101 pages; tables, maps. Available on request to the Division of Engineering Resources, Public Health Service, Washington 25, D. C.

Authorized by the Flood Control Act of 1950, the Arkansas-White-Red River Basin Interagency Committee determined that a comprehensive economic base survey should be made to serve as a guide for the future development of this river basin area. Intended to establish the developed and undeveloped natural resources in the area, the survey is divided into 10 parts: population; labor force and employment; income; chief patterns of economic activity; natural resources; health, housing, education, and recreation; opportunities for development; economic history of the area; special reports series; and future economic development and programs for achievement. Various Federal agencies were assigned to prepare the several parts of the report, the Department of Health, Education, and Welfare being responsible for the survey of health, housing, and recreation.

This publication contains statistics on the sickness and mortality rates, and the adequacy of medical and related services and facilities for the eight State sections and for various geographic subdivisions of the area included in the Arkansas-White-Red River Basin. The survey reveals that mortality rates from all causes are the highest for the New Mexico and Louisiana State sections and lowest for Kansas, the Texas Panhandle, and western Oklahoma. Mortality rates for tuberculosis are highest for Arkansas, Missouri, and New Mexico. The basin presents a few areas of high infant mortality, especially in the New Mexico and Colorado State section; maternal mortality rates are high in Arkansas, Louisiana, New Mexico, and eastern Oklahoma. The areas of greatest incidence of typhoid fever are mostly in the eastern and southern parts of the basin.

Health manpower is at a low level in the basin. It is about two-thirds that of the country as a whole for each of four types of personnel—physicians, dentists, nurses, and sanitary engineers. The number of general hospital beds in relation to the population is less in this area than in the country as a whole—2.9 per 1,000 persons in the basin, 3.6 in the United States. Only half of the counties have full-time local health units, but 72 percent of the basin population is served.

In terms of healthfulness of the area and the facilities available for the maintenance of health, as discussed in the report, the outstanding areas of the basin are Kansas, the Texas Panhandle, Colorado, and the western and central parts of Oklahoma.

Handbook on Sanitation of Vessel Watering Points

Public Health Service Publication No. 274. 1953. 12 pages; illustrated. Available on request to the Division of Sanitation, Public Health Service, Washington 25, D. C.

Important in the health protection of passengers and crew members aboard vessels is the provision of safe water for drinking and culinary purposes. This handbook is intended to serve as a guide for those who are charged with the design, construction, or operation of facilities on wharves and piers for loading potable water on vessels, and for the personnel of the Public Health Service and State and local agencies concerned with the supervision of vessel-watering points.

The standards set forth in this handbook are concerned with the protection of water during the course of delivery from an approved source to the filling connections of the vessel's potable-water storage tank. They cover the water-distribution system, protection against backflow from vessel to shore, protection on board ship and at the pier, hydrants, watering hoses, appurtenances, and water boats. Photographs and line drawings illustrate satisfactory installation of watering facilities.

The handbook also includes pertinent sections of the Interstate Quarantine Regulations, a brief description of the interrelationships of vessel companies, State health departments, and the Public Health Service, relative to methods of approving water supplies and watering points. It contains a copy of the PHS form, Report on Vessel Watering Point Sanitation.

Publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication (including its Public Health Service publication number). Single copies of most Public Health Service publications can be obtained without charge from the Public Inquiries Branch, Public Health Service, Washington 25, D. C.